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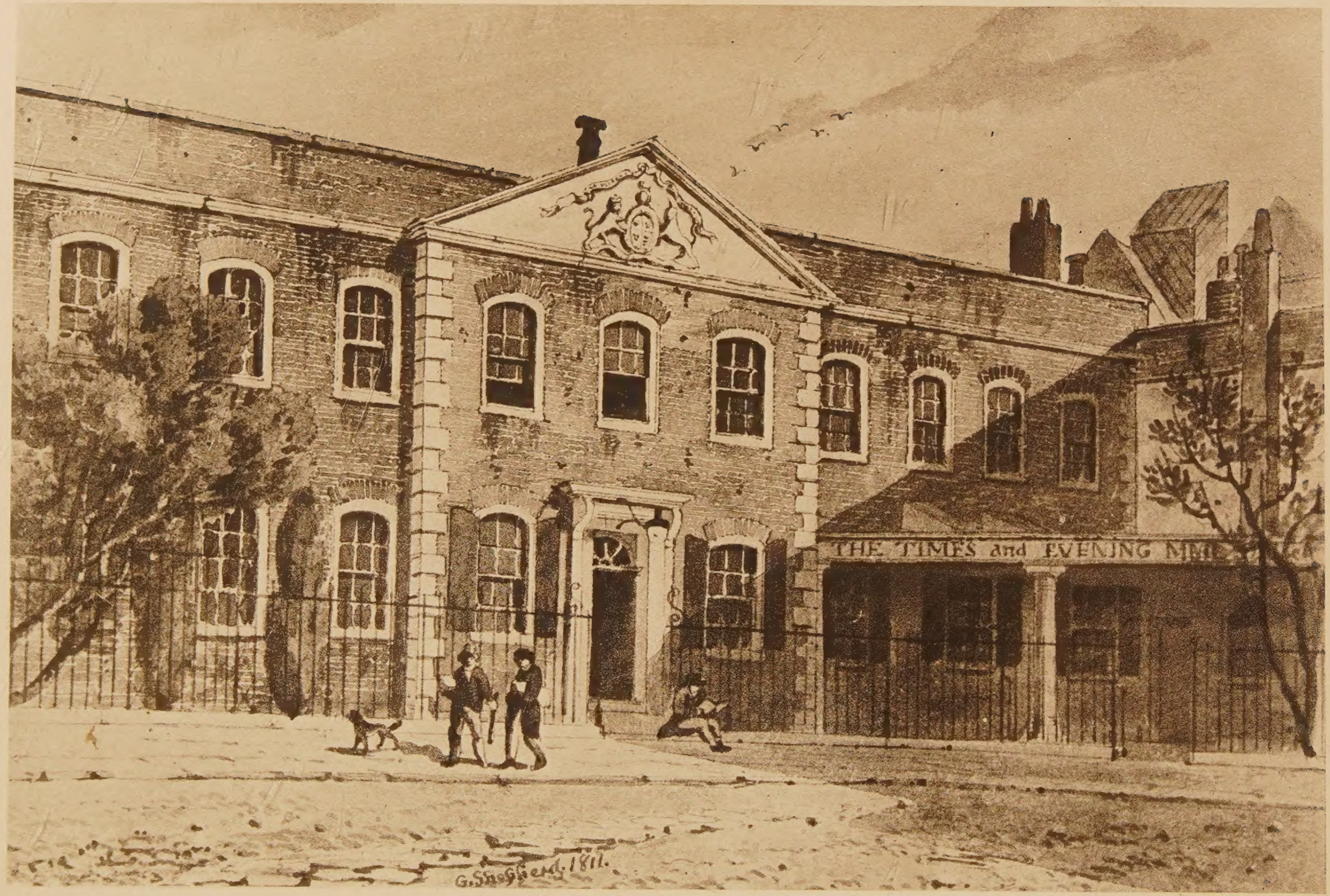
THE TIMES and EVENING MAI
G. Shepherd. 1811.

THE TIMES OFFICE IN 1811, FROM A WATERCOLOUR BY G. SHEPHERD

In the collection of Mr. John Walter

PRINTING IN THE TWENTIETH CENTURY

A SURVEY

Reprinted
from THE SPECIAL NUMBER *of*
The Times
OCTOBER 29, 1929

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TIMES PAST
THE TIMES
FUTURE

PREFACE

Seventeen years have passed since *The Times* marked the publication of its 40,000th number by issuing a collection of articles on printing. Changes not to be overlooked have taken place in these seventeen years; but the changes in printing and in its uses are less obvious than they might be because they are of the nature of development and of advance along a course already marked. There has been no need in these seventeen years for anything so revolutionary as the aims and achievement of the Kelmscott Press. From the impulse given by Morris and carried forward by Sir Emery Walker and others, the improvement in printing has gone forward so fast and so far that all which was mistaken or otiose in the reform has been safely cast aside. Not Morris's types, it is now agreed, but Morris's interest in typography; not Morris's books, but Morris's care for fine, true workmanship in the making of books are his true services to the art and craft of printing. In these seventeen years, or at any rate in the dozen of them which alone can count in the history of printing, the most remarkable change of all is undoubtedly the diffusion of the ideals and the practice of Morris into all but the remotest corners of the printing industry. In place of the artistic—and usually archaistic—amateur printer, we have the professional. He is no dilettante. He calls himself a printer. He knows the business of printing, and all the facilities and difficulties created by the trade unions and their conditions of labour, as intimately as he knows the technicalities of his craft. For all that, he is no less an artist in book making than were the masters of the great private or special presses. In the totality of their scope and function such men are the worthy successors of those whose mighty figures Mr. A. W. Pollard draws out of the past for our instruction and example. And their principal effect upon printing has been this: that, whereas even seventeen years ago beauty of design and fineness of workmanship were looked for only in expensive books, to-day ugliness and sloppiness are resented by an ever-increasing number of readers in the cheapest books, and even in newspapers.

Much of the success of these modern printers has come of their readiness to ally themselves with all that science can offer them in mechanical means. In his article on newspaper types, Mr. Stanley Morison remarks that the type of the Printing Number of *The Times* of October 29, 1929, reprinted in this volume, is that of its predecessor of seventeen years ago. *The Times* "went modern," he tells us, before the eighteenth century was out, and, in typography as well as in all other departments of printing, Printing House-square has always been in the van. Not from this office, therefore, is there likely to arise any support for the notion that beautiful printing and mechanical printing are incompatible. And in general, even in the production of books which are intended to make a claim to beauty, modern opinion bends towards the belief that the mechanical devices entirely necessary to newspaper work are aids to the finest artistic book making. The reader who glances through the sections of this book dealing with these devices will find there words and names which appeared, indeed, in the Printing Number of seventeen years ago. But many of these devices have travelled very far in the interval. And amid all the diversity and ingenuity which the labour of keen intellects and the incessant desire for improvement have already produced (only to promise something more wonderful yet before long), one reflection seems to remain just. These inventions can be made the friends, not the enemies, of the artist and the maker of beauty. Reference to the daily picture page in *The Times* might be almost sufficient proof of this idea; but the temptation is irresistible to appeal to the colour pages in the Printing Number, in which, for the first time in England, the powers of "natural" colour photography and of colour reproductions of works of art were exhibited in plates from which many hundreds of thousands of impressions had been taken. In illustration and ornament and in the making of a book as a single piece of beauty the new devices give the artist advantages for expression denied to him before. Even in the printing of letterpress they may be destined to reach undreamed-of power. At least one article in this volume suggests a future for printing in which typesetting, even by machine, shall play no part. The modern spirit in printing will brace itself to meet and to absorb even this almost incredible revolution, and turn it to the service of good work in book and in newspaper.

It is, of course, the newspaper which stands to win the first advantage out of any improvement in the mechanics of printing type or picture.

For newspapers, as for the processes which make them, these seventeen years have been years of rapid development. The old problem was how to get the news and some comment on it or explanation of it quickly enough to the ever-increasing multitude of readers whom the newspapers themselves (following the example first set by *The Times*) had taught to demand immediate information as a right. That old problem persists, and has been the spur to many an improvement; but to-day it is complicated by the new problem of coping with the enormous increase in the number and diversity of the subjects in which the still increasing public is interested. To its primary function of a means of record and dissemination of political news and knowledge the newspaper is asked now to add that of guidance and instruction in a hundred other fields. There is no limit to the questions on which it may be suddenly asked for information and counsel. Experts on every conceivable form of knowledge must be available to it. Functions that used to be left to the weekly or the monthly periodicals must now be performed by the daily paper. Decisions which a Government office or an intellectual society might ponder for days or weeks must be taken in minutes. The eye of the lynx and the suspicion of the fox must be kept alert for errors in the most unlikely places. The untrue and the less true must be sorted from the true, the insignificant and the less significant from the significant, at lightning speed. The most tempting news must be withheld if its publication should be likely to distort the public apprehension of the essential truth; and the most alluring scheme rebuffed if it should threaten wider interests. Under this constant strain of finding and clinging to the truest truth and the wisest wisdom, at the risk of condemnation for partiality, for dullness, for malice, for prejudice, for a score of other offences readily charged against the Press, those who are responsible for making six days a week such a newspaper as the public has been taught to expect naturally feel well disposed to any achievement of science which will save time in production and increase beauty and variety of presentation. Ever since the first John Walter took the King's Printing-house in 1784 the English newspaper has been a capital influence in the advancement of English printing; and English printing, in its turn, has helped to make the English newspaper what at its best it has the honour and the pride to be.

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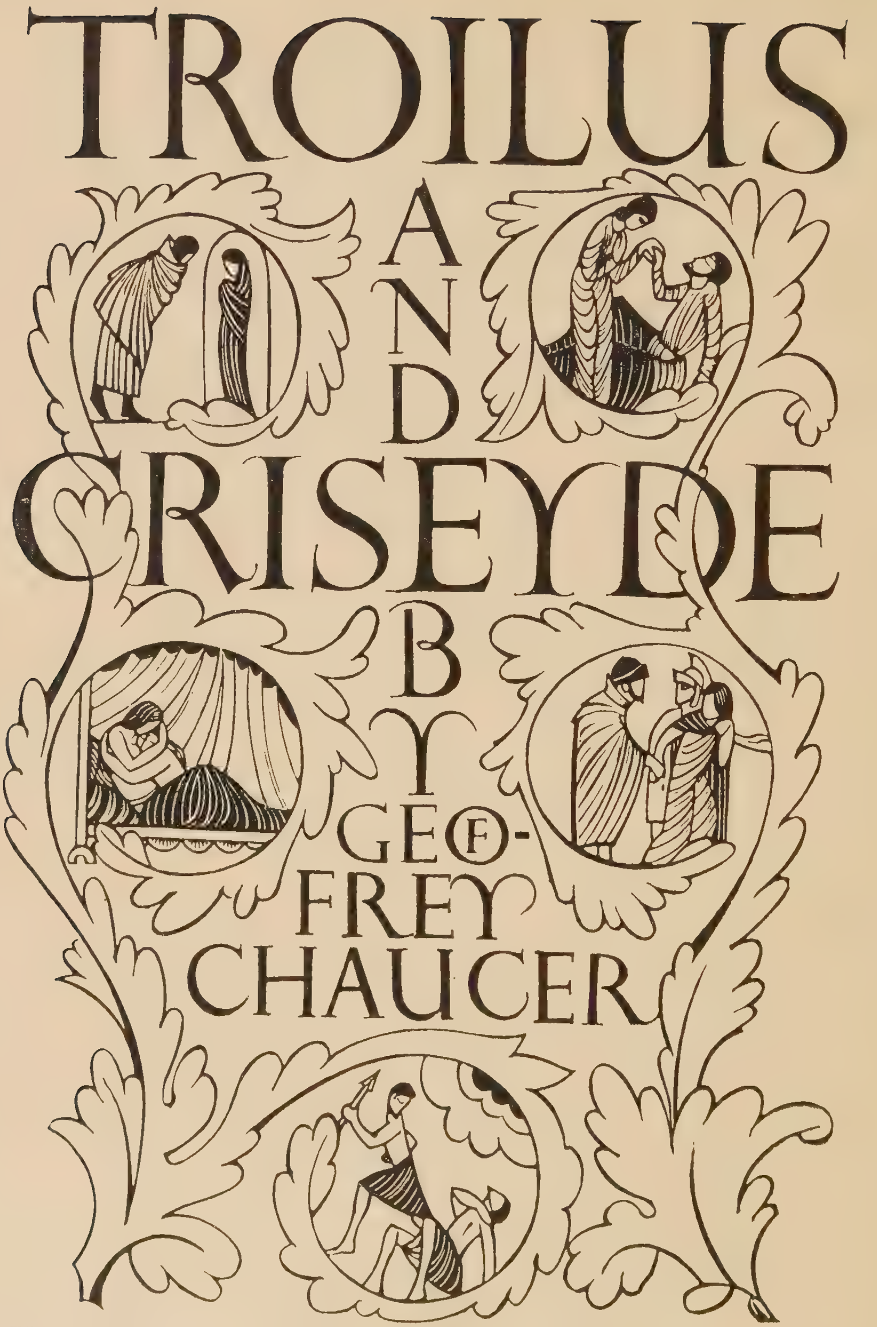

TROILUS
AND
CRISEYDE
BY
GEOFFREY
CHAUCER

The title-page of "Troilus and Criseyde," engraved by Mr. Eric Gill for the edition printed and published by the Golden Cockerel Press.

PART I
THE HISTORY OF PRINTING

CHAPTER I
FROM GUTENBERG TO OUR OWN TIMES

According to Ulrich Zel, the first printer at Cologne, the "most worthy art" of printing was invented "first of all in Germany at Mainz on the Rhine in the year of Our Lord 1440." Zel's date has been adopted for previous centenaries, and doubtless the fifth will be celebrated in 1940 and to the accompaniment of the usual outburst of dissertations. There is, indeed, still room to argue as to the Latin grammars (Donatuses) printed, according to Zel, in some fashion in Holland before work began at Mainz; as to what went on at Strasburg, where Gutenberg stayed for some years between 1440 and 1450; and as to the parts played at Mainz by Gutenberg, the recognized "inventor," by the goldsmith Fust, who lent him money and sold him up, and by Peter Schœffer, Gutenberg's workman, who went over to Fust and was given his daughter in marriage as a reward for his inventions. At present controversy, though not quite dead, is unusually pacific.

It is recognized that, instead of printing having sprung into existence in full perfection, many years of humble output had preceded the neat small types of the Mainz Indulgences of 1454 and 1455, the majestic Bible completed before August, 1456, and the splendour of the red-and-blue capitals and printing in red in the signed work of Fust and Schœffer during the next decade. On the other hand, the decline from these glories was accompanied by practical improvements during the next fifteen years, such as the ability to print more than one page at a time, the numeration of quires and leaves, and the introduction of title-pages, all of which played their part in making printing a success.

The art soon began to spread. We may trace Gutenberg's influence in its early appearance at Strasburg, where a great Bible was completed in or before 1460. Another great Bible, in a variant of Gutenberg's experimental type and probably of his printing, seems to have been published at Bamberg, where similar type was used by Albrecht Pfister for a few thin illustrated books; also in or before the year of Gutenberg's death (1468) one of his workmen, Berthold Ruppel, started a press at Basel. At Mainz the triumphant career of Fust and Schœffer was temporarily checked by the sack of the city in a struggle between two rival archbishops, for one of whom they had printed broadsides in a beautifully clear, small type. But in 1466 Ulrich Zel, one of their workmen, began his long and prolific career at Cologne, and soon all the more important riverside cities in Germany were provided with presses, busy printing books of every kind for which there was a demand, both in Latin and in German. A useful incentive to maintain a high standard was supplied about 1480, when, after Milan and Rome had led the way in printing missals (previously, we may presume, regarded as too sacred to be produced by a new-fangled mechanical art), German bishops commissioned printers to produce handsome editions sanctioned for use in their province or diocese.

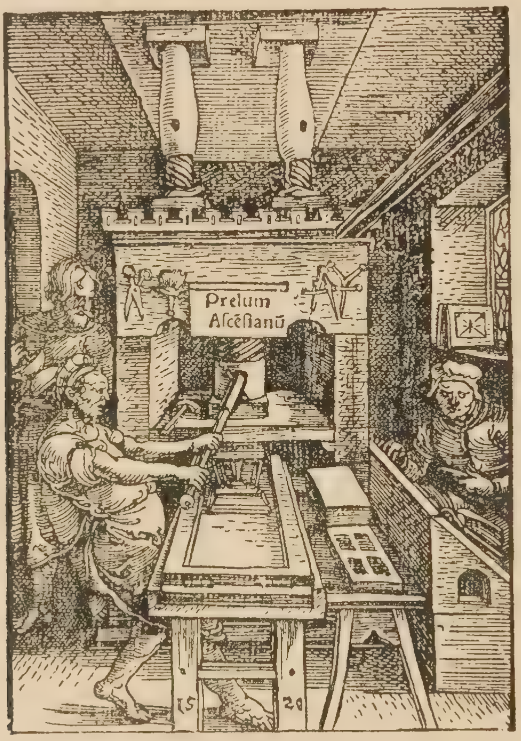
Most of these missals are printed in pointed church types akin in the canon to those used by Fust and Schœffer in their famous Psalters of 1457 and 1459, and in the rest of the service to those of the early "Gutenberg" Bibles. But two notable printers, Georg Reyser at Wurzburg and Erhard Ratdolt at Augsburg, used the rounder church type with which they had become acquainted in Italy and achieved (more especially Reyser) very beautiful results with it; a few other printers, chiefly at Nuremberg and Basel, worked on similar lines. Pointed letters, tall but narrow, made up of straight strokes ending in an apex, had been a device of ecclesiastical scribes to combine ceremonial dignity with economy in parchment, and when used commercially in small sizes the desire to save space becomes too evident. Hence when points were dropped and curves were given the form of curves instead of a series of joints, the printed page became more pleasing. The process was carried farther when the rounded gothic types took on more of the antique or roman letters of the ninth century out of which they had themselves been developed. These modified types used, at any rate occasionally, to be called semi-gothic or semi-roman, according as the one style or the other predominated, but in the newest nomenclature are classed together as *gotico-antiqua* or *fere-humanistica*. By whatever name they are called, some of the German ones are very beautiful, notably that used by Ulrich Zel in the "Summa" of Bartholomæus Pisanus of 1483.

This must certainly be called semi-gothic. An equally fine semi-roman is the magnificent type used by Lienhart Holle in printing the "Cosmographia" of Ptolemy at Ulm in 1482, which Mr. St. John Hornby has taken as the model on which is based the type of his magnificent "Don Quixote." Distinctively roman or "antiqua" types never throve in Germany, or in the first century of printing anywhere save first in Italy and then in France.

Besides her fine "mixed" types, Germany's special contribution to the diversity of founts were the two cursive vernacular types known respectively as "Schwabacher" (a word of unknown origin), which began to be used at Nuremberg in 1485, and the "Fraktur," which is adumbrated in the type used at Augsburg for the Emperor Maximilian's "Gebetbuch" (1514) and "Teuerdank" (1517), and assumed its characteristic form at Nuremberg and Wittenberg a few years later.

Altogether the contribution of Germany to the craft of printing in the fifteenth and early sixteenth centuries was a very notable one. Whatever obscure experiments may have been made in Holland before 1440, Gutenberg, Fust, and Schœffer were all Germans, and as a practical craft it was an all-German invention. The glory of the Fust and Schœffer books on their own lines is supreme, and the plainer books by which they were followed during the next twenty years, when the rubricator, as was intended, has brightened them with capitals, headlines, and paragraph marks in blue and red, are still delightfully gay. A few printers had good woodcut capitals, and the cuts in the German illustrated books, though less charming than those of Italy and France, have more dramatic power and characterization. The known output of Germany in the fifteenth century may be estimated at some 10,000 different editions, about a third of the total produced in Europe. Moreover, she had taught the rest of Europe to print, and, if production at the present day is more influenced by traditions derived from Italy and France, where finer manuscripts were available for imitation, it was from Germany that Italy and France received the craft.

The earliest of the German pioneers were Sweynheym and Pannartz, who in 1465, probably at the invitation of its abbot, Cardinal Turrecremata, set up a press at the Benedictine monastery at Subiaco, some miles from Rome, and printed there for two years with a "gotico-antiqua" type which Mr. St. John Hornby has used, with very slight modifications, in a long series of beautiful books from his Ashendene Press. In 1467 they moved to Rome, where, with a less successful but more purely "antiqua" type, they printed more books than they could sell, and came to grief. When they had reached Rome, Ulrich Han, probably a fellow-workman under Fust and Schœffer at Mainz, was already printing the "Meditationes" of their former patron, Cardinal Turrecremata, completing them on December 31, 1467. His "antiqua" types are undistinguished, but his large rounded gothic is very imposing.



This illustration from a book printed by Jodocus Badius, Paris, 1522, shows an early wooden hand-press. It will be noticed that the upper part was fixed to the ceiling.

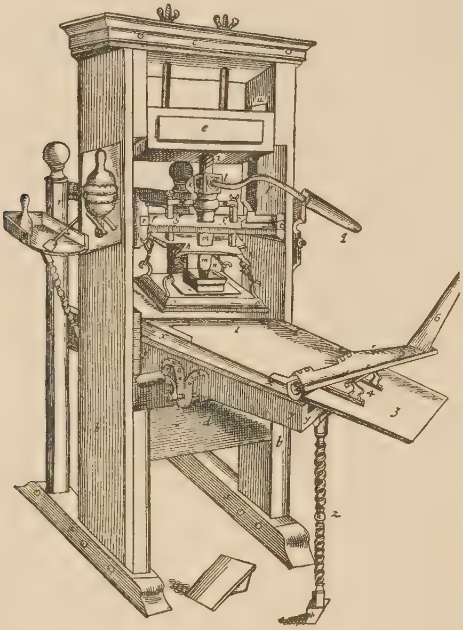
In 1469 John of Speier (the next town of importance up the Rhine from Mainz) obtained from the Senate at Venice a special privilege giving him the monopoly of printing in its dominions for five years. He died, however, probably before the year was out, while printing his fourth book, and though he was succeeded by his brother Wendelin the privilege lapsed, and an opening was thus made for a much greater man, Nicolas Jenson.

A native of Sommevoire on the Upper Marne, Nicolas Jenson is said to have been Master of the King's Mint at Tours, and according to a story, not satisfactorily authenticated, to have gone to Mainz in 1458 to study the new craft, presumably under Fust and Schœffer.

From 1474 he found it profitable to cut gothic types for more compressed printing in cheaper books, but he used a single "antiqua" fount throughout his career of a little over a decade, and this by common consent has never been surpassed. In his own books its merits are frequently obscured by thin ink and faulty presswork, but it has always been admired, and since its reproduction under the direction of Sir Emery Walker for the Doves Press books it has been made the basis of beautiful types in Germany, Holland, and the United States, and its influence on other founts has been great. Many other Italian "antiqua" types have charm, some very pretty ones being produced by unknown or little known printers away from the great centres, but none of them can stand the test of comparison with this master fount with which Jenson himself was content to the end of his life. The later Venetian types for the most part suffer from compression, but one used by Maker and Ratdolt in 1476 is very graceful, and the type of the "Hypnerotomachia Poliphili" printed by Aldus in 1499 has been not only admired but reproduced, though Robert Proctor, whose genius introduced order and comparative certainty into the enumeration and identification of fifteenth-century types, cordially disliked it.

Proctor's dislike for the types introduced by Aldus arose from the mischief done by his Greek founts, in which, as Mr. Scholderer remarks in his "Greek Printing Types," he "accepted unmodified the crowding and restless involutions of the vulgar script of the day and reproduced them in the rigidly fixed lines of a metal block." The earlier Greek printing in Italy had begun with excellent types in which the Greek quotations in Latin manuscripts had been adapted to range with the Latin by which it was surrounded. The two quotation types of Sweynheym and Pannartz at Rome are both good, that of Jenson at Venice still better. A later Venetian quotation type used in a "Macrobius" of 1492, probably printed by Joannes Rubeus, recently adapted by Mr. Scholderer, has rightly won general acceptance and is used in Greek quotations in *The Times*. The types used in the few books wholly or mainly in Greek produced before Aldus got to work had been based on Greek scripts of varying quality, and though they had met with little success and had failed badly as to accents and breathings, they had not imposed on Greek scholarship the mass of contractions by which Aldus burdened it for nearly three centuries.

With the help of many Germans and not a few French workmen, printing throve in Italy even more than in Germany. Before 1501 it had been practised in over fifty different places, and two-fifths of the known European output in the fifteenth century must be ascribed to their presses. Venice was by far the largest printing centre, and not only in editions of the Latin and Greek classics, but in missals and breviaries and annotated law books, it competed successfully with all rivals.



A wooden hand-press as used in 1683.
From an illustration in Joseph Moxon's
"Mechanick Exercises," &c.

After Germany and Italy the next place must be assigned to France. Here German printers were invited to set up a press at Paris in the Sorbonne in 1470, and the books issued there were printed in a handsome though rather restless variety of the type which henceforth we may call "roman," since now we are out of Italy the popular name for the style which the learned call "antiqua" is free from confusion. But the bulk of French printing in the fifteenth century follows vernacular gothic scripts, and some of these, especially when accompanied by contemporary woodcuts, are pleasant both to read and to look at. For vernacular books Lyons almost rivalled Paris, and good work was done elsewhere in the provinces. But it was not till well into the sixteenth century that the primacy of printing passed to France. Spanish printers (here again many of them German) produced some massively splendid early books and maintained this style farther into the next century than any other country.

The Low Countries produced a considerable output of not very important books. But while our own first printer, William Caxton, learnt his craft at Cologne in helping to print the "De Proprietatibus Rerum" of Bartholomæus Anglicus about 1472, it was at Bruges that he began to print about 1475 and with Low Country type that he started in England.

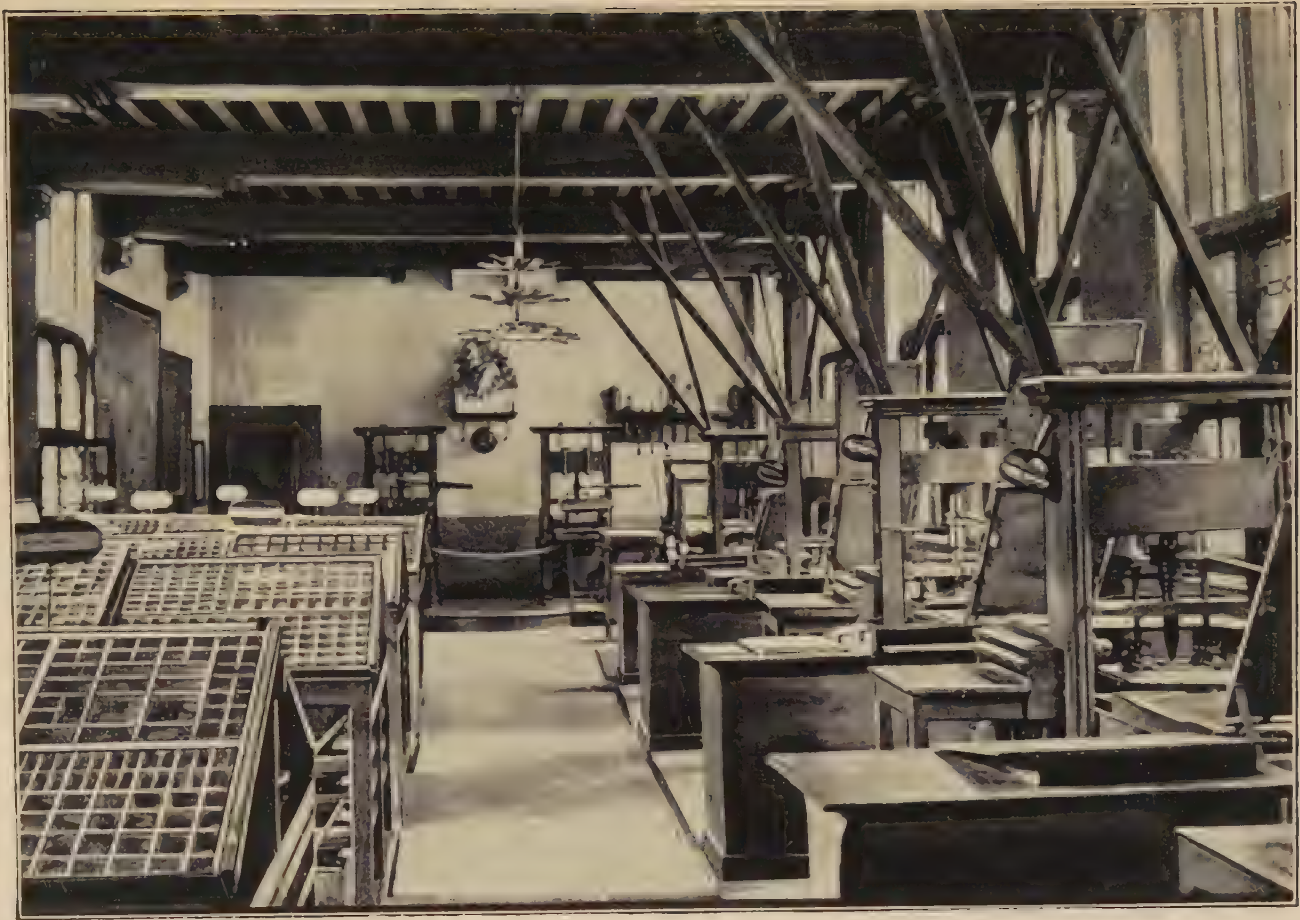
Caxton rented his house in the Almonry at Westminster from Michaelmas, 1476, and produced the recently discovered Indulgence before the middle of December. He printed just over a hundred books and documents in eight different types, neither he nor his competitors using any roman fount. His competitors were at Oxford a German from Cologne; two foreigners (one of them from Mechlin) in the City of London; and a schoolmaster printer, who must have been an Englishman, at St. Albans. When he died he was succeeded by his foreman, a Lorrainer, Wynkyn de Worde, who had as competitors William of Mechlin's successor, Richard Pynson, from Normandy, and Julian Notary, probably another Frenchman. De Worde seems to have got his later types from Paris, while Pynson patronized Rouen. Caxton printed good literature in an unpretentious and rather old-fashioned way. Pynson was quite a good printer. But there is nothing to be learnt from any of the printers in England in the fifteenth century or for some scores of years after.

Modern printing begins with the Vergil printed by Aldus in 1501 with the italics or cursive letters designed for him by Francesco Griffi. The long series of books in this form were handy and cheap, and italic was clearer to read than any equally compressed roman founts, while the use of gothic letters was already diminishing. So italic for the greater part of the sixteenth century was much used as a text type, usually for vernacular books, in both Italy and France, and was sporadically used in the same way in England and elsewhere. Then roman regained its supremacy and italics became a supplementary type. The custom of using them for quotations has resulted in their being cut to match roman founts of all sizes, and they are no longer fined down to occupy a minimum of space.

Italics were the last substantial gift of Italy to the craft of printing. The house of Aldus held its own for the best part of the century, and that of Giunta at Florence and the Gioliti at Venice produced good books. But by 1520 the Italian primacy in printing was waning, and though it is customary to say that it passed in the first instance to Basel, this is really to argue that because Froben secured for himself the printing of the works of Erasmus, and he and other Basel printers obtained border-pieces and other ornaments from Urs Graf and Hans and Ambrosius Holbein, Basel printing was superior to French.

It seems better to regard France as Italy's direct successor, more especially as Geofroy Tory had made two visits to Italy before he aroused interest in the forms of letters by his *Champ fleury* and brought a new influence into French book illustration and decoration by his Books of Hours. Tory himself, however, is of more importance as a decorator and writer than as a printer, and it was Simon Colines and his ward, Robert Estienne, and the typecutter Claude Garamond, who caused Paris to capture the lead from Venice, though it has been claimed that the influences both of Jenson and of the type of the Aldine "Hypnerotomachia" can be traced in founts with which Garamond is credited. The Royal Greek types, which, though they contained too many contractions, are so beautiful that they deserved their long-continued popularity, were cut by Garamond from the designs of Angelus Vergetius for Robert Estienne, and first used in 1550. From about 1540 to 1570 fine work was being produced not only at Paris but at Lyons, where Jean de Tournes and other printers, with types cut by Garamond and Robert Granjon, produced many fine books, notably some charming little ones with illustrations by Bernard Salomon.

Soon after 1570 wars of religion greatly hampered the French book trade, and the primacy, here again of publishing and elaborate book decoration rather than of printing, is said to have passed from France to Antwerp, where Christopher Plantin produced his famous "Polyglott" and was lavish in illustrations and ornaments and large types. But though he was certainly an enterprising book-builder, Plantin's taste was far from impeccable, and it is doubtful whether Paris was ever really dethroned.



The printing room in the Musée Plantin-Moretus, Antwerp. The room, arranged as it was in 1576, contains two of Plantin's original presses.

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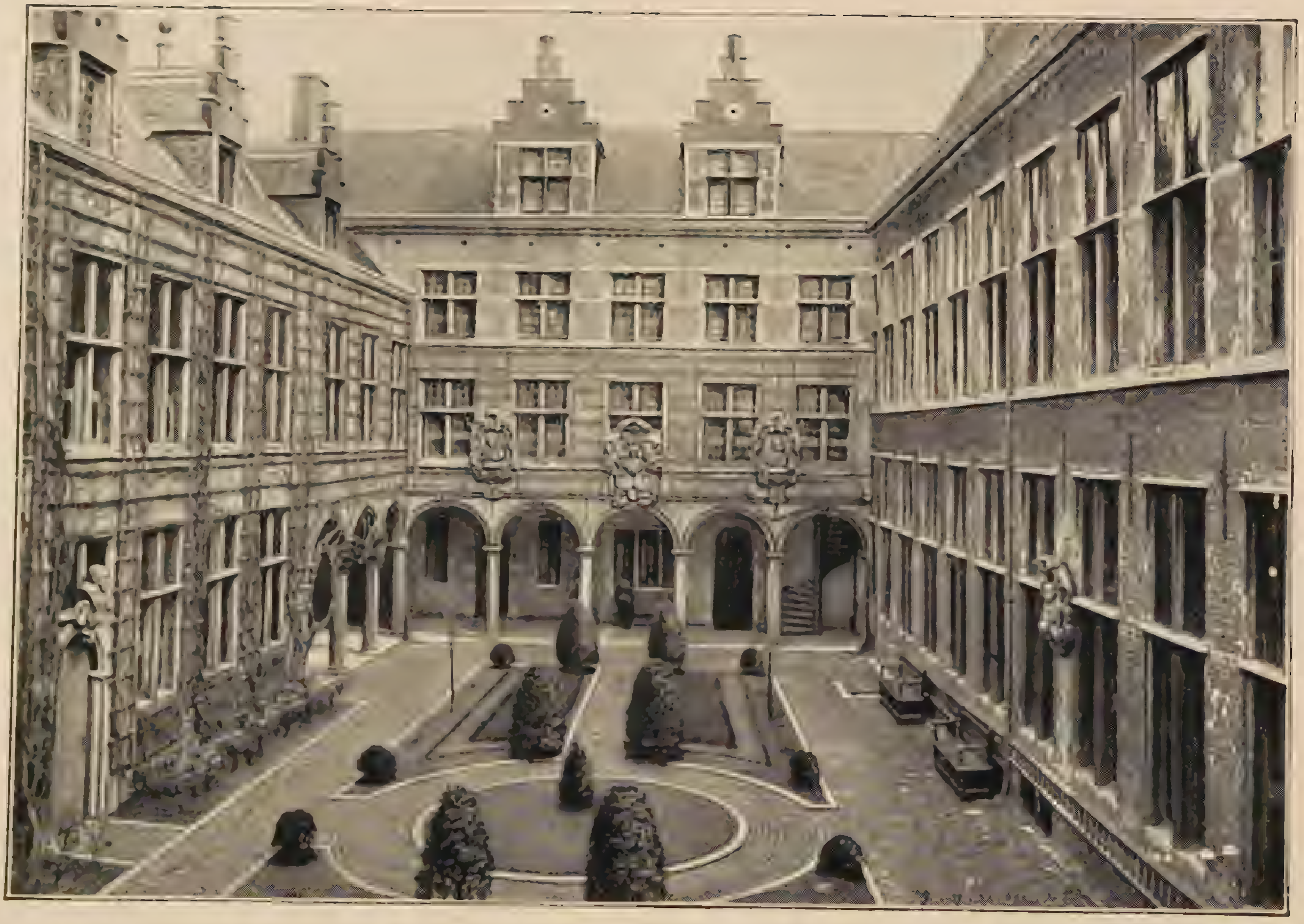


The courtyard of the Musée Plantin-Moretus, Antwerp, the home of the famous sixteenth-century printer, Christopher Plantin, and his son Moretus.

Facing page 9

In the second half of the sixteenth century, while printing on the Continent deteriorated, in England it improved, and in John Day we have an English printer who, with the support of Archbishop Parker, set himself to obtain good types, especially a fine fount of italics, and pictorial initials and other ornaments, mostly from abroad, and used them with some skill. Several later printers—Denham, Bynneman, Vautrollier, and Field—did good work, and towards the end of the century a few fine folios, such as Ponsonby's collected editions of Sidney's works (1598), and charming pocket volumes of verse, such as Constable's "Diana" and Griffin's "Fidessa," may inspire English book-lovers with satisfaction. Very little is known of English type-founding at this period, and it seems probable that some of the types used in English books were now, as certainly later on, procured from Holland. After the sack of Antwerp in 1576, Plantin for a time retired to Leiden, and it was at Leiden that his son-in-law, Franciscus Raphelengius, printed many fairly pretty pocket editions. At Leiden also the first of the Elzevirs started a printing house in 1583, which lasted well into the eighteenth century, and for about thirty years from 1624 was famous for its pocket editions of the Greek Testament, of Latin and Italian classics, and French memoirs. Later in the century it was from Holland that Bishop Fell procured the types he gave to Oxford, and Dutch improvements in the mechanism of printing were also adopted by English printers. What was wrong all over Europe about this time was that publishers had accepted a showy engraved title-page or frontispiece as a sufficient attraction to sell a book, and paid less attention to good type and presswork.

Early in the eighteenth century William Caslon emancipated English printers from dependence on Holland for their types, and a little later the brothers Robert and Andrew Foulis did good work at Glasgow. In 1757 an English printer, John Baskerville, for the first time gave a lead which was followed in France, Italy, and Germany, the type and presswork of his "Virgil" of that year and of his "Milton" of 1758 winning immediate success. Baskerville had been a writing master and made a fortune in japanning, and he tried to make his books look finer than those printed with Caslon's types by using a blacker ink and giving a gloss to the paper by pressing each sheet as it was printed between hot plates. His great merit was that he relied on his types and his presswork to make fine books, instead of on ornaments, and thus revived the dignity of the craft.

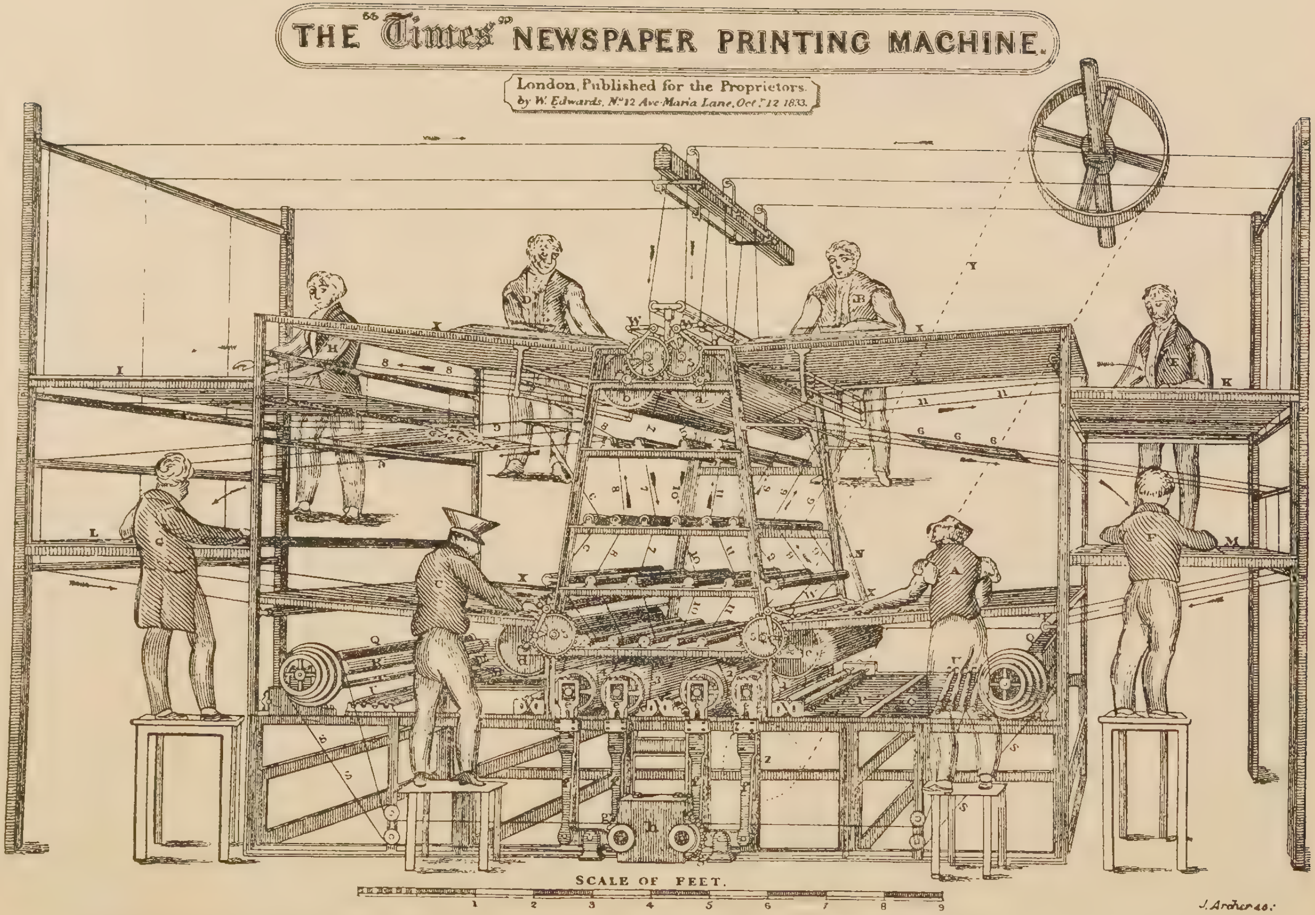
Baskerville's types influenced the work of Alexander Wilson, who cut types for the Foulises at Glasgow, and of Joseph and Edmond Fry at

Bristol, and even of the Caslons. After his death his best fount was sold to France; in Germany G. J. Goeschen was strongly influenced by him, and at Parma Giambattista Bodoni worked with extraordinary brilliancy on similar lines, but with a conscious determination to make his books magnificent which diverts attention from the text and reached its climax in a huge folio edition of the "Imitatio Christi." In England the delicacy of Bewick's wood engravings caused types to be designed which would harmonize with them, and a cloud of fat-faced types descended upon English printing, and after these had passed little noteworthy work was done until, in 1830, Charles Whittingham, who had been at work as a printer since 1789, became associated with William Pickering, a publisher of excellent taste, who persuaded him to procure copies of many of the fine capitals and border-pieces of the chief sixteenth-century French printers. More important still, Whittingham, in 1844, led the way in restoring the older Caslon founts to popularity, and though the charm of the best English books from 1830 to 1850 awaits a chronicler, good work was done. After the Great Exhibition of 1851 much of it disappeared in blatancy and, on the other hand, right up to 1890 many books, well laid out, were spoilt by the greyness of pages lightly printed with cheap ink. The books printed at the Chiswick Press, as the firm of the Charles Whittinghams came to be called from a brief sojourn at Chiswick, under the management of Mr. Charles Jacobi, stood out from this greyness, and so did many of those of Messrs. Constable, printers to the University of Edinburgh, especially when Walter Blaikie took a personal interest in them.

But though in 1889 William Morris accepted the Chiswick Press edition of his story "The Roots of the Mountains" as the best printed book produced in England for many years, he was not content, and in 1890 began printing the Kelmscott books, which in some eight years gave printing a new start all over the world, just as Baskerville (in a style to which Morris's was strongly opposed) had done in 1757. The Kelmscott books did this, first, by being supremely good in their own rather heavy style, and even more than this by demonstrating that there was a public willing and eager to pay high prices for specially well printed books. Attempts to imitate Morris's founts uniformly failed. Working in his spirit, but taking Jenson's splendid roman type for his model, Sir Emery Walker procured from Mr. Prince, a great typecutter, a fount which for the first time brought out the full beauty of the Jenson letter. Across the water the *éclat* of Morris's books induced the Riverside Press, of Cambridge, Mass., to form a special department of their big business for finely printed books in limited editions, and in that special department Mr. Bruce Rogers made wonderful experiments in printing books in the typographical style of the period to which they belonged, producing also many other fine books and a few almost unequalled in their beauty. Then in 1918 Mr. Bruce Rogers came to England, and for a year or two acted as typographical adviser to the Cambridge University Press, previously best known for its accuracy, but which now suddenly leapt into prominence for admirable taste and perfect presswork. For some time also English printers had begun to realize that a machine called a "Monotype" quickened composition, saved the cost of distribution, and made every piece of type new as from the mint as the compositor called it into existence.

This new interest in fine printing and the wealth of good material on which it can draw are not confined to England and the United States. In the 1929 exhibition in the King's Library at the British Museum, illustrating British and foreign printing of the years 1919-29, fine books were shown from a dozen other countries. It is no exaggeration to say that never since the decade 1470 to 1480 has so much fine new work been brought into existence and so much interest been taken in its production.

A. W. P.


THE "Times" NEWSPAPER PRINTING MACHINE.
London, Published for the Proprietors.
by W. Edwards, No. 12 Ave-Maria Lane, Oct. 12 1833.
SCALE OF FEET.
1 2 3 4 5 6 7 8 9
J. Archer sc.

The printing press invented and constructed by Applegath and Cowper, *The Times* engineers, in 1827.

CHAPTER II

"THE TIMES" AND PRINTING

REMARKABLE ACHIEVEMENTS

From the year 1784 until the present day all the chief improvements in the printing of newspapers have been either invented or first tried and fostered in what is now the office of *The Times*. Yet the man who started this unexampled story of progress happened upon printing almost by accident. When other means of livelihood had failed, John Walter bethought him of a certain printing process in which he had become interested a few years before. The process was that known as logography, and it consisted of printing with logotypes, which are combinations of letters. It had been invented by a compositor named Henry Johnson, who had first devised it not for letters, but for figures. He wanted to publish every evening a list numerically arranged of blanks and prizes drawn daily in the State lottery, and this could not be done in time by the ordinary methods of composing. Johnson therefore made types of from two to five figures, each of which could be set up as quickly as a type of a single figure. The method was successful; and Johnson was adapting it also to the printing of words, when John Walter bought his patents and after a time started his own type foundry and turned printer on his own account. Early in 1784 he took "the King's late printing-house near Apothecaries' Hall," which stood on part of the site now occupied by *The Times* Office. The premises had been vacant for about fourteen years when John Walter took them and started logographic printing in earnest. By strenuous work he reduced the 90,000 words in the English language to about 5,000, "by separating the particles and terminations, also removing the technical terms and obsolete expressions." These 5,000 he still further reduced by disintegrating the words into syllables, roots, prefixes and terminations, and thus produced a fount which was capable of being arranged in four compositors' cases, each measuring 6½ feet by 4½ feet.

The object was to take from the case a combination of as many letters as possible at each movement, and yet not to have so many combinations to select from that the compositor would take a long time in finding the one he wanted. Each combination was made of separate letters cemented together. All the letters of the fount were first cast singly with a slightly shorter shank than an ordinary fount, and with the lower part of the shank narrower than the upper. The required logotype was then set up in the usual fashion, and the word or part of a word thus composed was inserted face downwards in a mould fashioned to the shape of ordinary type. Melted type metal was then poured in so as to fill the mould and bind all the separate letters together. Released from the mould, the logotype was then ready for its place in the case, and, being shaped like ordinary types, could be used by the compositor in conjunction either with other logotypes or with single letters. Obviously this ought to make composing a much quicker job than with single letters only. John Walter maintained that it did, and he was probably right. But his logography never received a fair chance. The printers and booksellers resented the invasion of one who was no printer, but who printed very well; and they put every obstacle in his way. He appealed to the King, to the public, to the trade; and everywhere he found opposition and neglect. Still he believed in his logography, and was resolved to prove its worth. To nothing could quick printing be so valuable as to a newspaper. John Walter started a newspaper, *The Daily Universal Register*; "Printed Logographically," as it proudly stated; and its first number was published on January 1, 1785. The droll part of the story is that very quietly logographic printing was dropped out of use in his printing-house. On January 1, 1788, the 940th number of his newspaper appeared with the new title "*The Times or Daily Universal Register*, Printed Logographically." On the following March 18 the alternative title disappeared. "Printed Logographically" survived for some time afterwards, and in 1789 he printed a pamphlet with logotypes; but it is doubtful whether logographic printing was used to any great extent in the paper. Walter had fixed the price at 2½d., instead of the usual 3d., in order to prove the cheapness of this method of composing; but his printers demanded to be paid as if each combination were taken from the case in separate letters. When the title of the paper was changed, the price was raised to 3d.; and it may have been about that time that logographic printing, though still used by Walter for other work, was discontinued in the newspaper. And when, in the 1850's, an attempt was made to revive the use of logotypes, *The Times* was foremost in pouring scorn on the idea.

The desire for the quickest possible publication of news and the widest possible dissemination of the paper led to the improvements in printing which *The Times* has effected. The first improvement to be made was the greatest and most striking of all. On November 29, 1814, when the first John Walter had been dead two years, and his son, the second John Walter, had been for eleven years in sole charge of the paper, *The Times* published an article which stated:—

"Our journal of this day presents to the public the practical result of the greatest improvement connected with printing since the discovery of the art itself. The reader of this paragraph now holds in his hand one of the many thousand impressions of *The Times* newspaper, which were taken off last night by a mechanical apparatus. . . .

"Of the person who made this discovery, we have but little to add. . . . It must suffice to say . . . that he is a Saxon by birth, that his name is Koenig, and that the invention has been executed under the direction of his friend and countryman, Bauer."

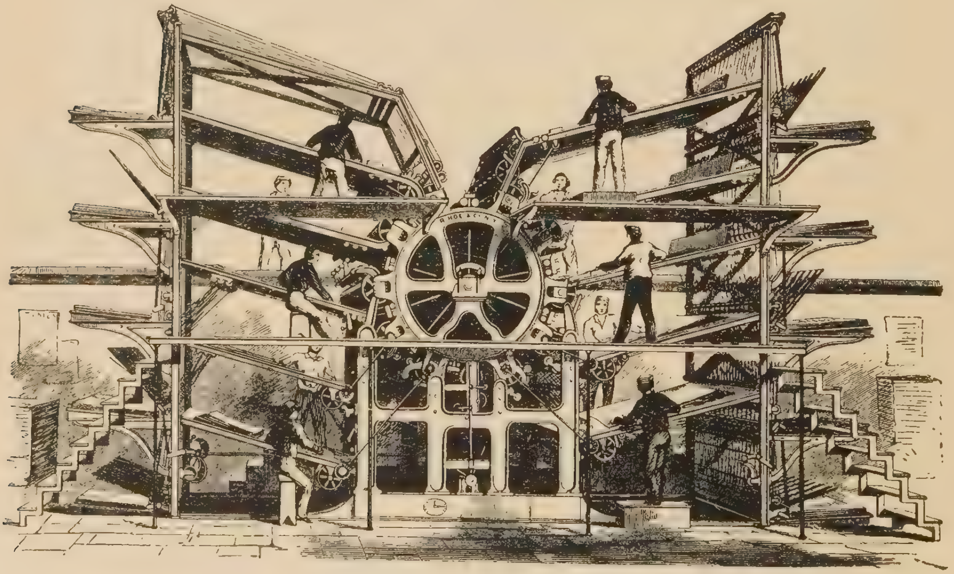
It is possible that Koenig owed something to a cylinder press patented by William Nicholson in 1790. The secret was the use of a cylinder to take the impression from the flat bed of type, which was carried under the cylinder and under the inking roller by steam power. The Koenig press was the first steam press; and it could print from 1,000 to 1,100 impressions an hour of the little four-page sheet (20in. by 32in.) which *The Times* then was; and that, pitifully small though it seemed, was more than four times as many as could be printed till then by hand. The great revolution was begun, and like most revolutions once begun, it went ahead quickly. Improvements were constantly being effected in *The Times* Office to the Koenig press by two ingenious inventors whom John Walter had put in charge of his printing and engineering departments after Koenig's return to Germany; and in 1827 these men, Applegath and Cowper, produced a new press which could print from 4,000 to 5,000 copies an hour. The machine required eight attendants, four to lay the sheets of paper on and four to take them off when printed.

Twenty-one years later, in 1848, Augustus Applegath made history by producing his first rotary machine, which could print 10,000 copies of the four-page *The Times* in an hour. In this machine, for the first time, the types were not laid flat, but attached to a cylinder. The cylinder was 5½ feet in diameter, and stood vertically. It was not, in fact, a true cylinder, but a number of planes each of the width of a column of the paper. This cylinder was surrounded by eight impression cylinders, at each of which sheets were fed to the machine. Two of these eight-cylinder machines were in use at *The Times* from 1848 to 1868. Another Applegath machine, with nine cylinders, was in use till 1857, when it was removed to make room for the first Hoe machine. The Hoe was an American development of the rotary. The cylinder in this machine was a true circle and was placed horizontally, the types being attached to it in cast-iron beds, one for each page; and the machine also had a device for laying the printed sheets in piles on tables. A ten-cylinder, or rather ten-feeder, machine, such as was made in England to order of *The Times*, would produce 20,000 sheets an hour, printed upon one side at a time.

On October 1, 1861, the tax was taken off paper, and the last obstacle to quick printing was removed. Experiments had been going on for some time in France and England in the making of stereotypes, and in printing from a roll of paper by means of cylindrical stereoplates. In 1862 the manager of *The Times*, J. C. MacDonald, and the chief engineer, J. Calverley, began to experiment on these lines. In 1866 they patented what afterwards became the famous Walter Press. The Applegath and Hoe presses had printed direct from the types fixed on the cylinders, and were fed with separate sheets of paper, each of which could be printed only on one side at a time.

In the Walter Press there were two cylinders carrying stereoplates each cast from a page of type, and two impression cylinders covered with blanket. The paper, unwound from a continuous roll several miles in length on a spindle, was passed over a tension roller, then over damping cylinders which wetted it on both sides, and so to the printing appliances. Passing between the upper printing and impression cylinders, it was printed on one side; then it passed between the other pair and was printed on the other side. Next the cutting cylinders cut it up into completely printed newspapers, which were delivered from the machine not folded. Mechanism for folding, which had been first used in Liverpool, was added to the Walter Press in 1885. The Walter Press remained in use in *The Times* until 1895, and for at least ten years after that one of these presses, though no longer in use, was still to be seen in the office. The successor to the Walter Press was the Hoe three-roll press. Newspapers were increasing much in the number of their pages, and the increase had been contrived either by installing more single-roll machines or making combinations of several machines in one. The Hoe three-roll press, with two reels of paper at one end and one at the other, made any such combination unnecessary. In 1908 the first Goss and the first Hoe presses came to Printing House-square: octuple presses capable of printing a 32-page paper at the rate of 25,000 copies an hour; and since then further additions and improvements have brought about the marvels of machinery which are described elsewhere in this book.

The newspaper which came into existence in order to demonstrate the advantages of a method of quick type-setting was not likely to lag behind in any efforts to attain that end by other means. From the invention of printing until the first quarter of the nineteenth century printers had been content to have their types set by hand, each letter (except in the brief adventures into logography) being taken by hand separately from the case and put separately into the compositor's stick. The earliest attempt to do this by machinery seems to have been made in England about 1822, but not till nearly fifty years later did any such machine come into practical use in *The Times* printing-house. A German named Charles Kastenbein was brought into *The Times* Office; and there, in or about 1868, he began the development of a type-setting machine which he perfected in 1879. This machine could set up 298 lines of *The Times*, amounting to nearly 17,000 separate types, in an hour. The principle of it was that of a magazine of separate types, from which, on the pressure of a finger-key, each type as required was released and put in its right place in the line being composed. Types thus set up had to be distributed, that is, returned each to its proper place in the case on the composing machine after the printing was done. Several efforts were made to devise a machine which would do this satisfactorily by means of nicks in the type; but in the end it was found that the quickest and surest method of distribution was through the melting pot. It took less time and cost less money to melt used type down at once and cast it all fresh for each printing than so to distribute it that it could be used again. This was partly due to the invention by a member of *The Times* editorial staff, Frederick Wicks, of a rotary machine for type-casting. Wicks served under Delane in the seventies, and left to found the first Conservative newspaper in Scotland, the *Glasgow News* (now the *Glasgow Evening News*), with the help of Sir William Pearce, founder of the Fairfield Shipbuilding Company. He returned to London about 1889 to write novels, and to develop the idea of his type-casting machine, which he had already evolved in Glasgow. He never returned to journalism, but devoted himself to the building up of the type foundry which subsequently supplied *The Times* for several years. The type used to come from the foundry in Blackfriars-road, across Blackfriars Bridge, in galleys, to be filled into the type-setting machines in *The Times* Office. After the stereos had been cast the type was turned into "pie" and sent back to the foundry to be melted down again. It was a very interesting development, but the initial experiments in perfecting the machine had been so costly that the company ultimately failed, and the debenture-holders foreclosed. Nevertheless, the combination of this machine for casting with the Kastenbein machine for type-setting supplied *The Times* until the introduction of the Monotype, the Linotype, and the Intertype machines. Thus in both the departments of printing, the composing and the machining, *The Times* has steadily initiated, fostered, and encouraged experiments for improvement in speed, in quality, and in efficiency, and has been the parent of some of the most remarkable achievements in the art and craft of the printer.



Hoe machine in the *The Times* Office, 1857.

CHAPTER III

THE MODERN NEWSPAPER FROM 1850 TO 1929

The extraordinary development of the modern newspaper Press began with the beginning of the second half of the last century, the chief actuating cause being the abolition of the various taxes with which newspapers had up to that time been burdened. The amount of the taxes varied from time to time, but it may be said, roughly, that until half-way through the nineteenth century there was a newspaper duty on every printed sheet of 4d. a copy, there was a stamp duty on every advertisement of 3s. 6d., and there was a duty on paper of 3d. a lb. Within a decade all these imposts were swept away. The advertisement duty was repealed in 1853, the newspaper duty in 1855, and the paper duty in 1861. It has been calculated that in 1865 the number of copies printed by London papers alone was six times as large as the total circulation of all papers in the United Kingdom had been twenty-five years earlier. The removal of the taxes had made the penny journal commercially practicable and paved the way for a new style of journalism, in which the *Daily Telegraph* was the pioneer. In the years that followed, the cheapening of paper—through the introduction of wood pulp and the perfecting of paper-making machinery—and the increased revenue from advertisements were among the causes which led to the successful production of the halfpenny daily newspaper.

It is commonly assumed that the great increase in the reading public in the latter half of the nineteenth century was a creation of the Education Act of 1870, but, immense and even revolutionary though the influence of that Act was, the increase had in fact begun before that. The new urban populations brought into being by the industrial revolution were mentally more alert, more eager for education, and more interested in politics and public affairs than the rural population of the earlier period, and this mental alertness and desire for information had been much quickened by the agitation in connexion with the Reform Laws.

Of the galaxy of great morning papers published in London which contributed to make what is often spoken of as the Augustan Age of British journalism, the *Morning Post* had been established in 1772; *The Times* in 1785; the *Morning Advertiser* in 1794; the *Standard* in 1827; and the *Daily News* in 1845. Among these *The Times* was in a class by itself, having in 1855 a circulation of approximately 50,000 copies, while no other paper printed as many as 7,500 copies, and most of them did not print half that number. The selling price ranged from 2d. to 5d. a copy, when into this select company came the *Daily Telegraph*. Its first arrival, however, was unsensational, for it was started as a single sheet priced at 2d. Founded in June, 1855, the paper failed within three months, and then passed—taken, it is said, in satisfaction of an unpaid printing bill—into the hands of Mr. J. Moses Levy, who, besides being a practical printer, was a man of genius and saw his opportunity. He converted the single sheet into a four-page paper and sold it at 1d. It cannot claim the honour of being the first penny paper in England. It was, indeed, anticipated by the *Liverpool Post* by some three months. Moreover, before 1855 there seem to have been cheap papers published more or less surreptitiously which simply ignored the payment of the newspaper duty, but they were generallv short-lived. The *War Telegraph*, or, later, the *Manchester Telegraph*, for example, published by Mr. John Bastow and sold for 1d., appears to have been started in Manchester in 1854 and to have survived for about fourteen months. The *Daily Telegraph*, was, however, the first London penny paper, and it addressed itself deliberately to the middle classes: to a public, that is, wider and less critical and aristocratic than that to which the Press had so far been content to appeal. Its success was almost immediate, both in circulation and in advertising revenue, *The Times*, easy in its assured leadership and contemptuous of such competition, permitting it to take from it a large part of its "classified advertisements," as they are now called, which for so long provided the *Daily Telegraph* with a substantial proportion of its income. As the newcomer grew in strength it was abundantly ridiculed, and the new word "Telegraphese" was coined to describe the flamboyant and wordy style which characterized most of its writing. But both the original Levy and his son were exceptional men, shrewd judges of the taste of the public, which they sought to entertain rather than to instruct, and with courage to back their judgment financially to almost any limit. Under Edwin Arnold's editorship, moreover, the *Daily Telegraph* collected as brilliant a staff of writers as was, perhaps, to be gathered in London then; and one after another the other papers found themselves compelled to meet the new competition by enlarging their papers, widening the scope of their reporting, popularizing their style of writing, and, above all, reducing their price to 1d. The *Standard* dropped to that price in 1858, the *Daily News* in 1868, the *Morning Post* in 1881, the *Morning Advertiser* in 1891, while the *Daily Chronicle*, hitherto known as the *Clerkenwell News*, entered the lists as a penny daily in 1877.

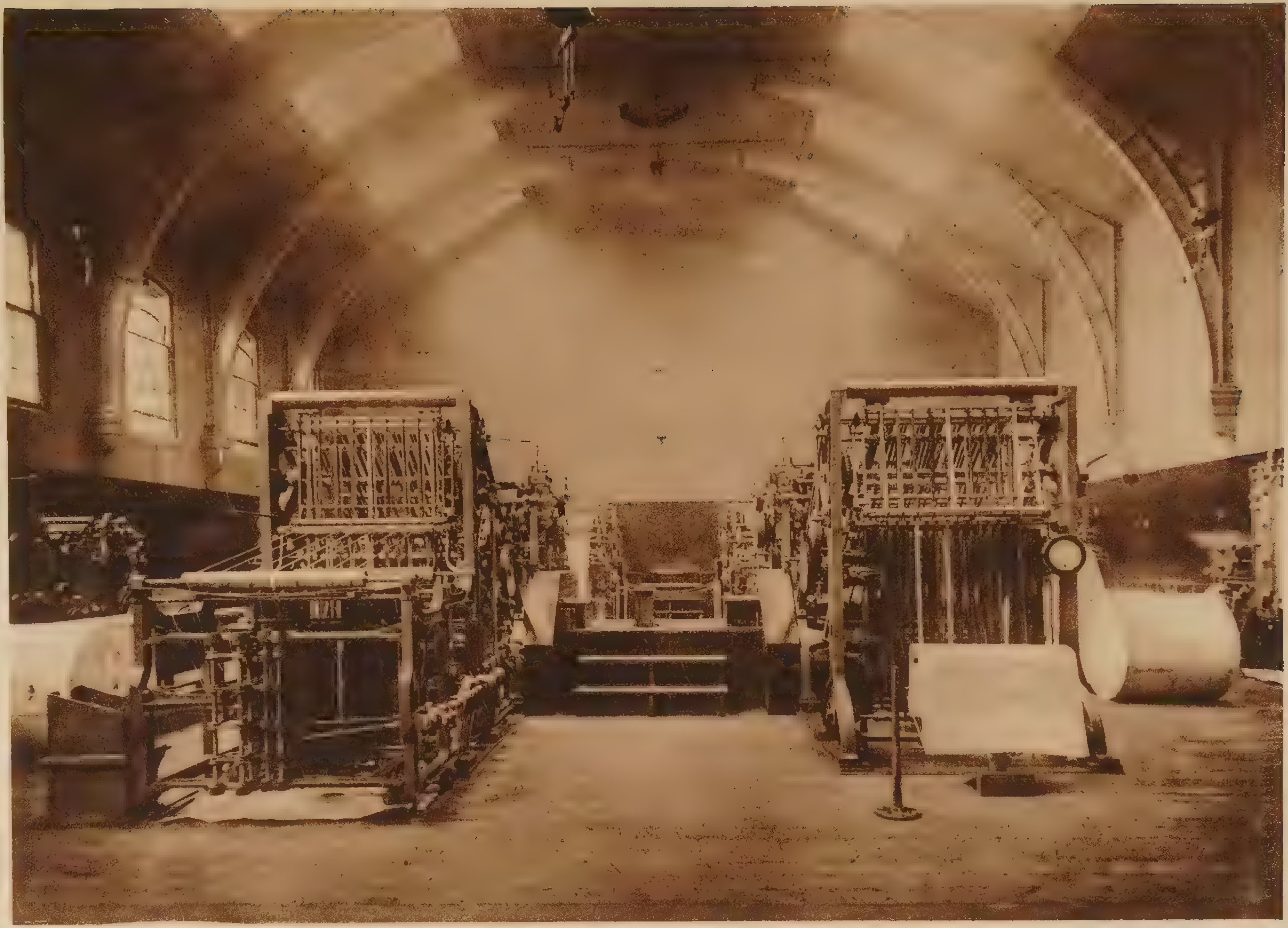
The revolution to penny journalism was complete, only *The Times* refusing to follow the general example. With the repeal of the Stamp Act in 1855 it had, indeed, reduced its price from 5d. to 4d.; and when the paper duty was abolished in 1861 it dropped another 1d., and in 1866, at a price of 3d., its circulation reached 66,000, a figure remarkable at the time, but destined to be completely overshadowed by the gigantic circulations of the penny papers in the next quarter of a century. But it was chiefly through the enterprise of *The Times* that the printing of these great numbers of copies was made possible. Even when *The Times* had been a single sheet of four pages, with a circulation of no more than 20,000, the difficulty of producing so many copies by the old hand presses had been so great that often the edition was not printed off until late in the afternoon. The story of the successive steps by which this difficulty was overcome through the courage and far-sightedness of John Walter the Second and John Walter the Third, the story of the inventions of Koenig and Applegath, Kastenbein and Wicks, and of John Walter the Third himself—all this is told at length in the preceding article on "*The Times* and Printing." It is not possible to estimate the magnitude of the debt of the Press of the world to the Walter family.

It was, then, the combination of these three factors that gave birth to modern journalism: the abolition of the taxes, making possible the sale of a paper at a moderate price; the genius and enterprise of the Walters, making possible the production of a paper in large numbers within a reasonable space of time; and the vision of Levy and his son (who adopted the name of Lawson and later became Lord Burnham), who saw that a great middle-class public was ready to absorb a paper at a cheap price adapted to its tastes and interests. While it was in London morning journalism that these forces were most immediately operative, the revolution spread much wider. Conspicuously interesting was the group of evening newspapers which grew up in London towards the end of the century. The *Globe* had been in existence since 1802, but had had a chequered and difficult life until it came into the possession of William (later Sir William) Madge in 1868. The *Pall Mall Gazette*—

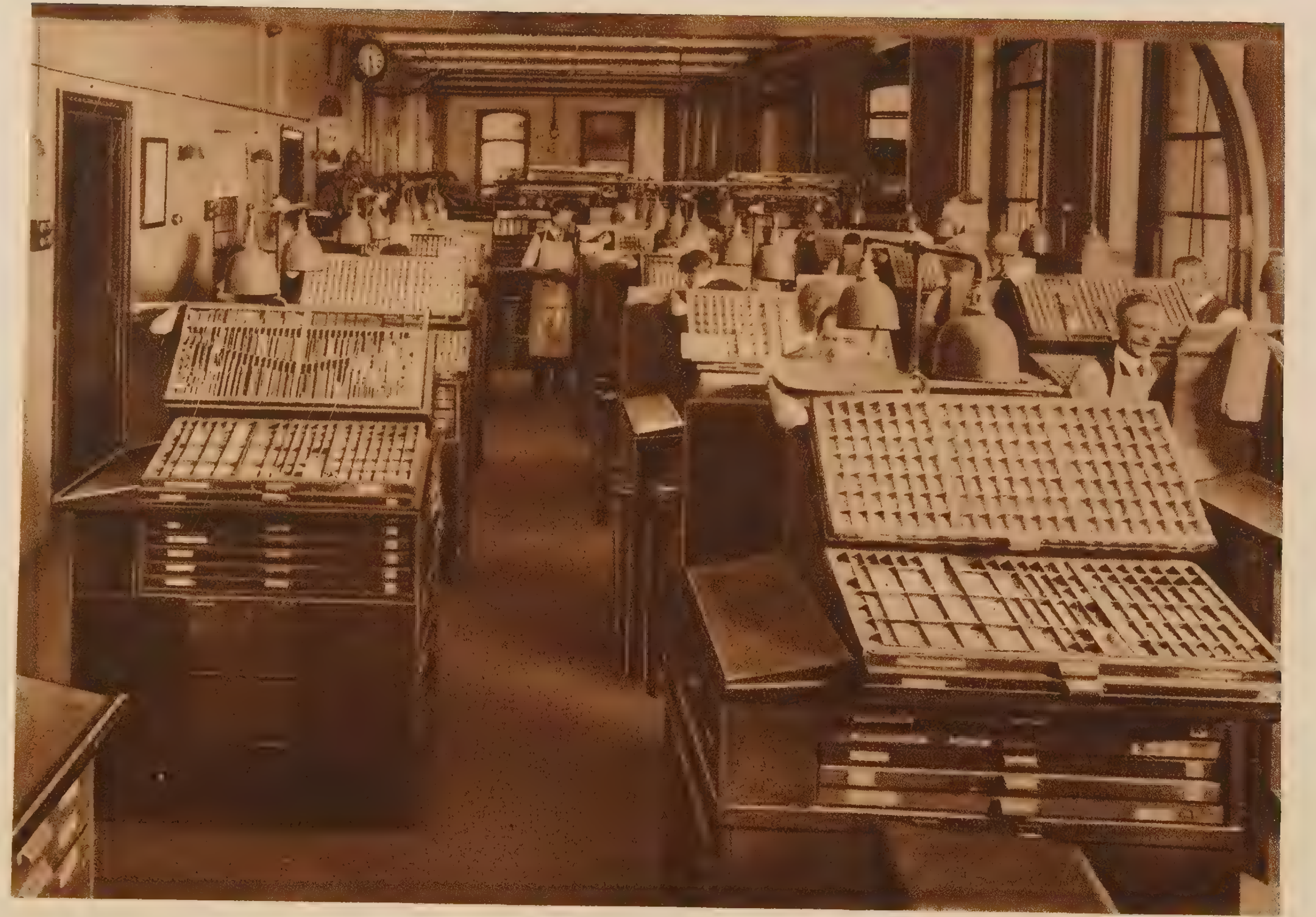
the paper "written for gentlemen by gentlemen"—was founded in 1865, and it was the model for the *St. James's Gazette*, started by James Greenwood, the former editor of the *Pall Mall*, in 1880, and the *Westminster Gazette*, which came into existence in 1893. No trio of evening papers of so high a literary standard has probably ever co-existed in any country. They were, perhaps, too good. Certainly they were too costly in format to be able to hold their own against the less expensive and still more "popular" type of paper which was soon to appear. With these was the gallant little halfpenny *Echo*. It was not the first halfpenny paper to be established in London, for an *Evening News* at that price had been started in 1855, but had died young. Many journalists of the older generation still living cherish among their most distinct memories of London half a century ago the cries of the vendors of the "A'p'ny Evenin' Ekker !" The second *Evening News* was founded in 1881, but languished until acquired by the Harmsworth interests in 1894. The *Star* was founded in 1888. These papers crystallized the type of evening paper which is still dominant in London to-day.

The provincial Press was even more prompt than were the metropolitan papers to respond to the abolition of the duties by reduction in price. It has already been said that the first penny paper in England was the *Liverpool Post*. In the same year, 1855, both the *Scotsman* (founded in 1817) and the *Manchester Guardian* (1821) came down to 1d. and laid the foundations of the great and honourable influence which each has since wielded. The *Birmingham Post* was started as a penny daily in 1857, and during the next decade the great majority of the influential provincial papers of the present day either came into existence or reduced their price to 1d. and, from having been published weekly or semi-weekly before, became dailies.

The revolution thus effected exercised a profound influence on English life in all its channels. The newspaper, formerly a luxury of the educated few, became the common daily reading of the masses of the people. The quickening of communication by the spread of railways and the invention of the electric telegraph enabled the papers both to collect intelligence and to distribute their editions on a scale hitherto undreamed of; and for the first time the whole people was brought in contact daily with the same news, the same ideas, and was capable of being swayed simultaneously by the same emotions and enlisted *en masse*, almost between sunrise and sunset, in a common cause. Before the end of the century, however, a second change, almost as far-reaching as the first, was to come, the part borne by Levy with the



The Press Room of *The Times*, showing Walter Presses manufactured at Printing House Square and used in 1868.



Part of the composing room in *The Times* office showing the latest type of steel frames.

Daily Telegraph being played now by Alfred Harmsworth (afterwards Lord Northcliffe) with the *Daily Mail.* In many ways the plot and the situation in the two cases were very similar.

Of all human institutions journalism is perhaps the most unquiet; a ferment of unrest is always working in it. None the less, while progress in detail was continuous, and new papers, whether London or provincial, daily or weekly, came and passed without ceasing, the revolutionary impulse of the mid-century had fairly spent itself, and conditions had become approximately static after forty years. Meanwhile the Education Act of 1870 was bearing fruit, and even more influentially, perhaps, the newspapers themselves were creating an appetite for reading in the masses of a new generation. The first successful appeal to this new public on any large scale was made by George (afterwards Sir George) Newnes with a weekly paper, *Tit-Bits*, which was published first in Manchester in 1880, and quickly attained an astonishing circulation. Inspired by its example, in 1888 Alfred Harmsworth started the weekly paper *Answers*; and two years later C. Arthur Pearson (who had been manager for Newnes) launched *Pearson's Weekly*. All three displayed extraordinary ingenuity in forcing their publications on the attention of the public, especially by the offering of large money prizes for simple competitions, and by a variety of what in modern slang are known as "stunts," of which a famous example was the soaking by Pearson of the whole of an edition of his *Weekly*, at the time of an influenza epidemic, in eucalyptus, so that every news-stall and paper-shop reeked of the smell, and thousands of people carried the papers on their persons as a protection against the disease. All the three papers earned for their owners large fortunes, which were used either to establish new papers and magazines or to buy others already in the market. Most of the new publications were trivial, though some (like *Country Life*, established by Newnes) fully deserved the success they won. Many died in their infancy; others caught the popular taste and made money.

Altogether each of the three men named built up a great publishing business, and in 1896 Harmsworth started the *Daily Mail*, a halfpenny morning newspaper. Its impact on the established journals was, *mutatis mutandis*, almost precisely parallel to that of the *Daily Telegraph* forty years earlier. There was the same inducement of a lower price, the same frank appeal to a larger and less critical public, the more boisterous thrusting for publicity than had formerly been known, and the lavish spending of money both on spectacular enterprises and on securing the services of writers of first-class talent. As with its predecessor, the real strength of the *Daily Mail's* appeal lay in the fact that, allowing for the objects for which it was intended, it was extremely well done. It quickly won enormous success, and in 1900 Pearson founded the *Daily Express* in close imitation of it.

Meanwhile the invention of the means by which half-tone reproductions of photographs could be adapted to publication on fast cylinder presses opened up new vistas to enterprising publishers seeking large circulations, by permitting an appeal to a public which needed not even to be able to read, and with the beginning of the new century some of the largest circulations were claimed by papers like the *Daily Mirror*, the *Daily Sketch*, and the *Daily Graphic*, which relied almost entirely on their illustrations. All the morning papers also without exception began the publication of "picture pages," some of which, as in the case of *The Times*, have reached a very high standard of artistic excellence.

More important, however, than any detail of the contents, policies, or mechanical production of the new type of papers was the method of their genesis. The great publishing houses—Harmsworth, Newnes, Pearson (and they were soon to have imitators)—threw off new publications, daily, weekly, or monthly, much as a great shop might take up a new line in boots or hosiery. They commanded great wealth, and only great wealth could compete with them. More and more the periodical Press of the country has tended, and is still tending, to pass into the hands of a few powerful organizations, the control of which is in most cases in the hands of one individual or of the members of one family. It is not possible to regard the increasing commercialization of the Press thus brought about without some regret and misgiving. Immense power is now concentrated in the hands of a few very rich men, and more and more the public is coming to look upon individual papers as mere instruments to be used for the advancement of personal ambitions or in accordance with the whims and caprices of the owners; while the position of the editor has inevitably lost much of its old dignity. The new conditions also make any intimate personal contact between the proprietors and the majority of the employees as difficult as it is in other great industrial organizations.

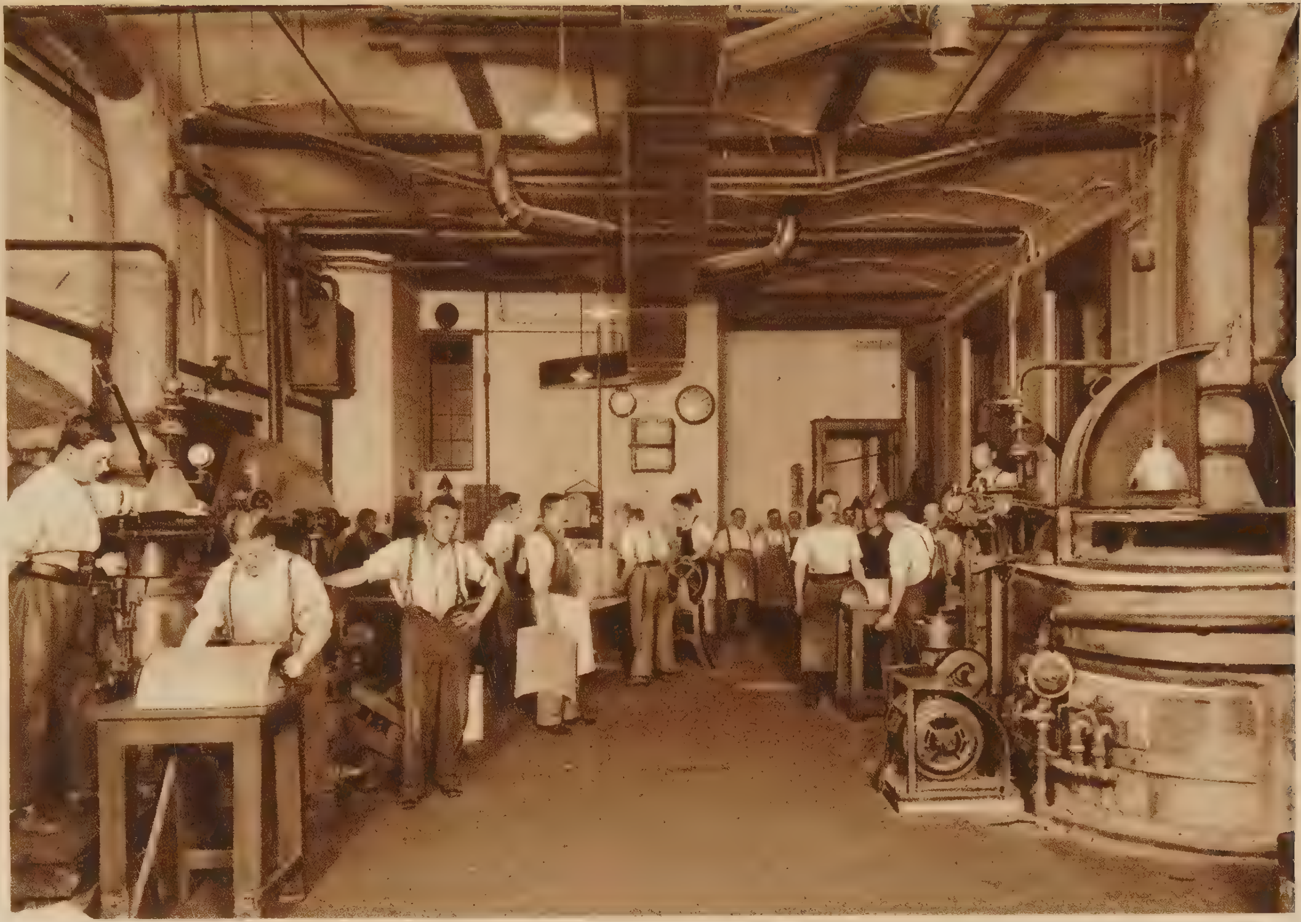
An influence which it is difficult to assess at its proper value, but which has undoubtedly been not without considerable effect in the last half-century, has been the interaction of the British and the American Press. In those years so fruitful in England, from 1860 onwards, the regular development of the American Press was checked by the Civil

War. The end of the war left a few conspicuous Republican papers scattered among the cities of the North—New York, Boston, Philadelphia, Springfield, Hartford, Cleveland, Cincinnati, and so forth—each associated with and edited by some one masterful man. These leading papers formed and controlled the opinion of the people. For the next two decades, while the country was feeling its way back to prosperity, these papers, especially in the East, were very largely modelled on British lines and influenced by British thought. In 1883 Joseph Pulitzer bought the *New York World*, and by spending money lavishly on publicity and appealing to the love of sensationalism in the less discriminating masses, especially by exploitation of every kind of criminal or police court news, he soon obtained for it a huge circulation. In 1895 Mr. W. R. Hearst came from California with large capital behind him and bought the *New York Journal*, to become quickly involved in a bitter fight with Pulitzer and the *World*, out of which fight developed the phrase "yellow" journalism. The term arose from the colour used by the *New York World* on certain cartoons published in its Sunday editions, but was soon applied throughout the country to both papers, and thence generally to all journalism of the ultra-sensational type. Both the journals obtained enormous circulations, and no American has questioned that their influence on American journalism as a whole was extremely bad. In the first years of the present century a writer comparing the newspapers of the two countries recognized the conspicuously better tone of the English Press as a whole (though the United States has never been without a limited number of journals of quite exceptional quality), but pointed out that while the English papers were still in large measure addressed to an educated class, the first principle of the majority of American papers was to avoid all suspicion of intellectual superiority and to appeal directly to the democratic mass. He added:—

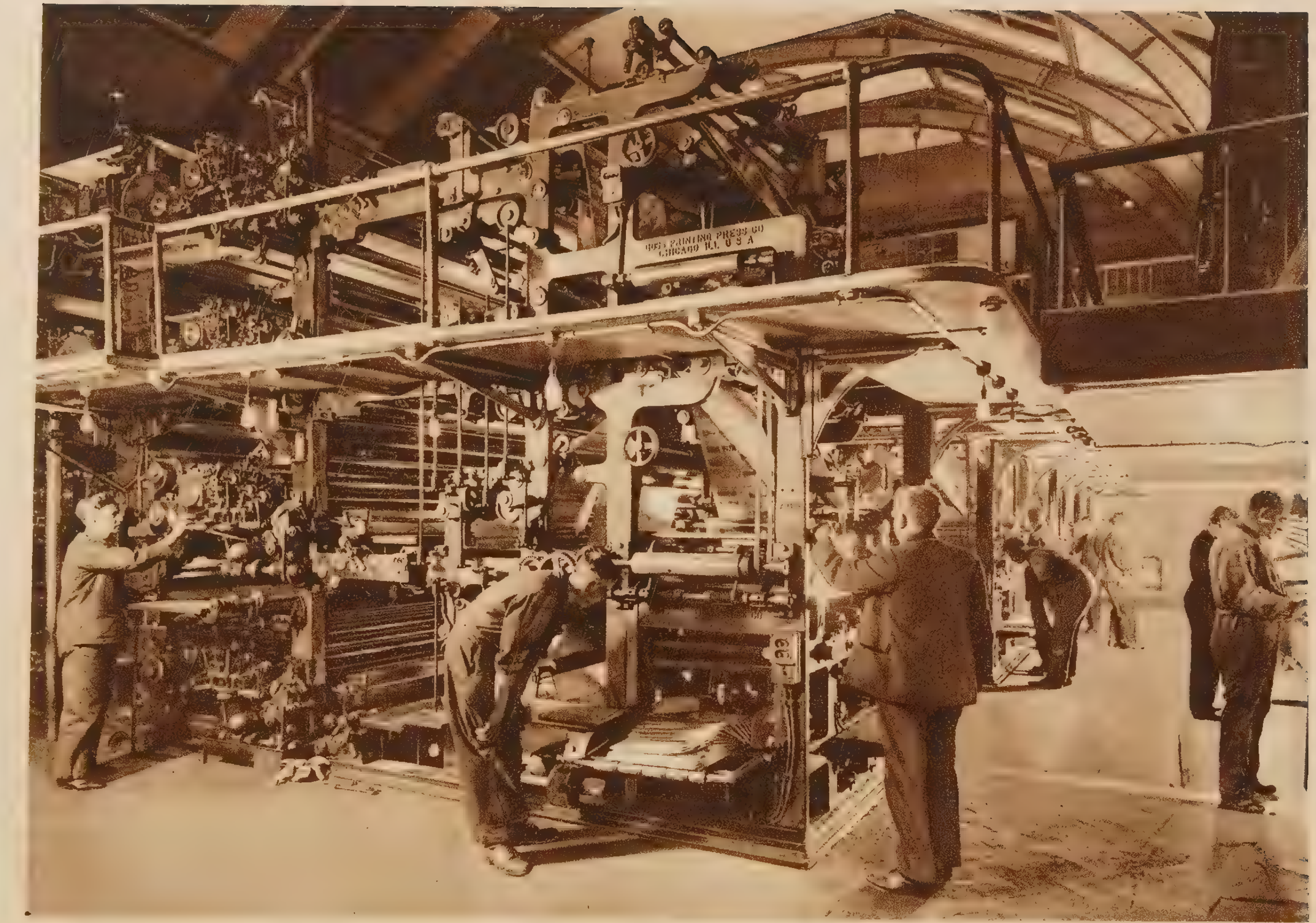
"It may not be chimerical to imagine a time when in London only two or three papers will hold to the class tradition . . . while the great body of the English Press will have followed the example of the American publishers; and when the English papers are frankly adapted to the tastes of as large a proportion of the people as are now catered for by the majority of the American papers, he would be a rash Englishman who would prophesy that the London papers would be any more scholarly or more refined than are the papers of New York or Chicago."

The relations between the Press of the two countries have grown very much closer of recent years, and American influence is discernible in many details of the newest type of English newspaper, as in the style of headlines and methods of "make-up" of the pages, and in the use of "comic strips," and so forth. In some of the London papers which boast conspicuously big circulations as large a share of the space is now occupied by reports of crime and catastrophe as is occupied in any paper in America. How much of this is the direct result of the example of the "yellow" American Press or how far it is an independent growth, the mere consequence of an appeal to the appetites of an immature and largely uneducated public, it is impossible to say.

Whatever changes may be brought about by internal forces—by the ingenuity, the enterprise, or the policies of editors or proprietors—the whole Press is subject to the constant pressure of one great external force which no newspaper can resist—namely, the continuous quickening of communication all over the world and the growing interdependence of peoples. The result has been an immense multiplication of the sources of news in recent years, and an incalculable increase in the number of topics written about and in the amount of material which daily flows into a newspaper office, from its own correspondents and from the news agencies, whose activities have become a striking feature of modern journalism. A consequence is that no topic can be given the space which might have been devoted to it a few years ago. All articles have to be shorter; condensation has come to be of the greatest importance; and the amount of leisurely or decorative writing in the daily Press tends continually to decrease. There is no prospect that this tendency will diminish in the near future; and it is hardly possible that papers such as *The Times* can increase their size much beyond the present limits, when editions of 32 pages, apart from all Special Supplements, are not uncommon. There seems no alternative except more rigorous compression and more ruthless abandonment of anything like ornamental writing. In spite of all difficulties, however, and notwithstanding the distaste with which many people to-day look upon certain journals, the success of which rests so largely on sensationalism, those, probably, are not mistaken who believe that the British Press—not the London dailies only, but the provincial Press and the weekly papers—is much the best in the world if excellence in news-gathering, high literary quality, and truthfulness and integrity of purpose combined be taken into account.



A corner of *The Times* Foundry where the plates for the printing presses are cast.


GOSS PRINTING PRESS CO
CHICAGO ILL U S A

One of the big presses at Printing House Square photographed at the start of the night's run.

CHAPTER IV

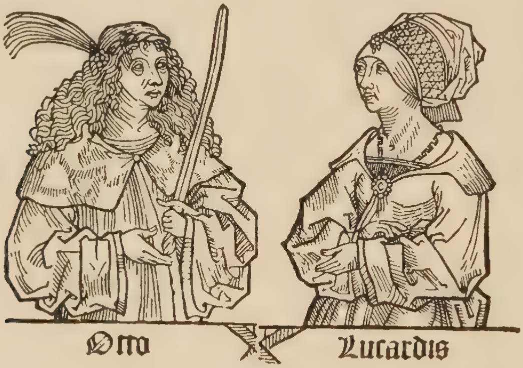
PRINTING IN SCOTLAND

Printing has been called a staple industry of Scotland, and it is remarkable what a large proportion of books published in London bear the imprint of Scottish presses. R. and R. Clark, T. and A. Constable, Ballantyne, Hanson and Co., Morrison and Gibb, all at Edinburgh, R. Maclehose and Co. at Glasgow, and the University Press at Aberdeen are all names commonly found in books of the leading London publishers.

The story of the rise of these Scottish firms goes back to the eighteenth century. The London dealers, jealous of their rights, took legal action in 1745 to restrain their Scottish rivals from the publication of cheap reprints. Litigation on the question of perpetual copyright continued until 1771, when Alexander Donaldson won his last action and perpetual copyright was quashed by a decree of the House of Lords. Donaldson was a pioneer in the publication of cheap books, and made a fortune, in spite of the London trade.

The Foulises at Glasgow, although they kept out of the litigation, reaped the benefits of Donaldson's efforts. The famous Glasgow firm, aided by the support of the University, raised the standard of printing in Scotland. Their example, together with the establishment of type-founding as a Scottish industry by Alexander Wilson, did much to foster the trade. A visitor to Edinburgh in 1774 praised the quality of the books published there, and declared that the cheapness of labour induced many Scottish booksellers residing in London to have their books printed in Edinburgh. However, Archibald Constable, the founder of a great Edinburgh firm, reported that in 1788, when he entered the trade, there were few new books published and little work done for London publishers. It was during his lifetime, the age of Sir Walter Scott, that Edinburgh became a famous centre of publishers and printers. The story of Scott's connexion with the firm of Ballantyne is well known. James Ballantyne, a schoolfellow of Scott's, was editor and printer of the *Kelso Mail* in his native town. One day Scott suggested that he ought to keep his types busy by printing books. Ballantyne followed his advice, moved to Edinburgh, became the printer of the *Edinburgh Review*, of all Scott's works, and of the many publications in which Scott interested himself.

The present state of affairs, in which Scottish firms print mainly for London houses, dates from after 1850, and that date suggests that the economies of railway transport led to this change in the habits of the London trade. We find that the Constables began to print for London in 1853, that the firm of R. and R. Clark, founded in 1846, followed them in 1854, and the Ballantynes after they were joined by Edward Hanson in 1859. The firm of Maclehose goes back to 1838, but their work for London publishers is comparatively recent.



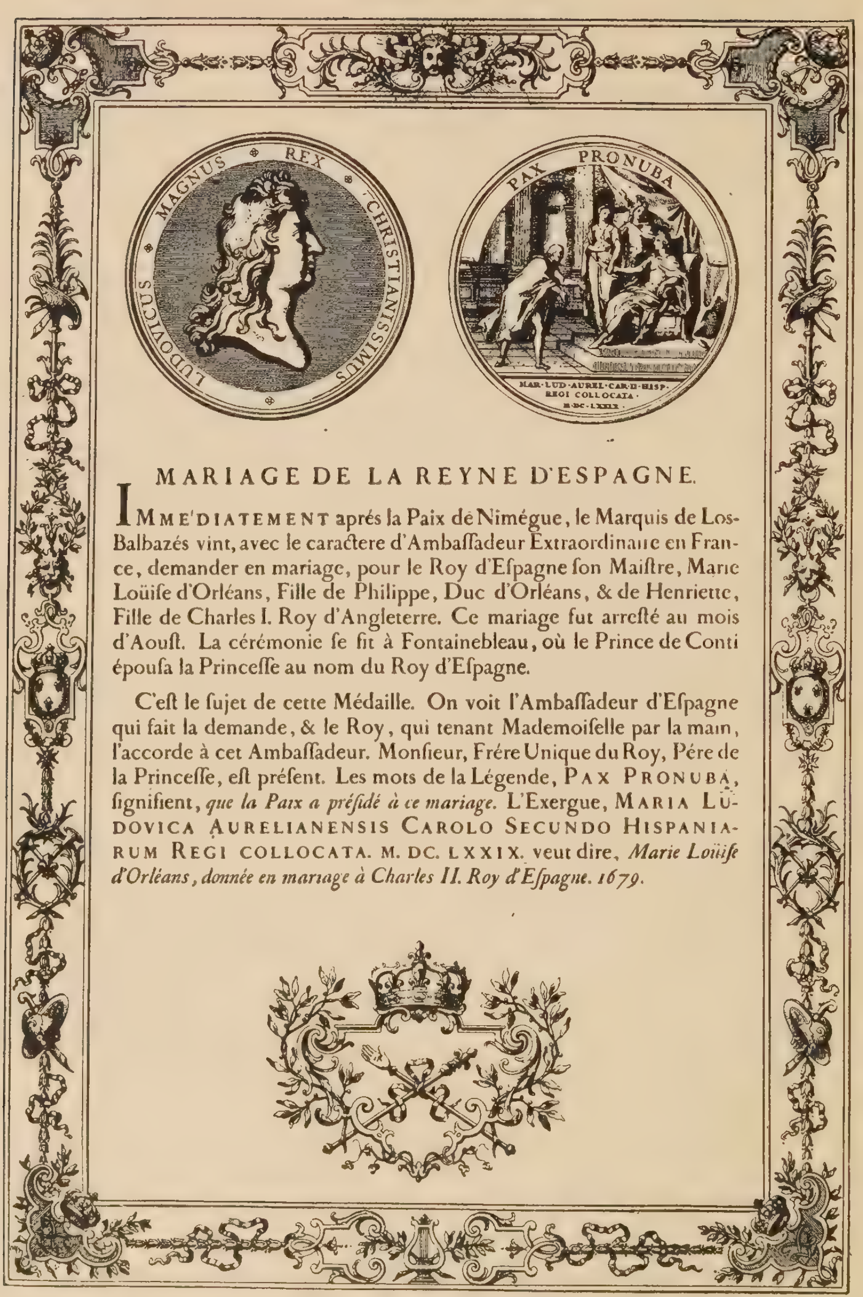
Woodcut from "Chronik der Sachsen," Mainz, Peter Schœffer (1492).

PART II
TYPOGRAPHY

CHAPTER I
TYPE-FACES AND DESIGN
GOTHIC AND ROMAN

The origin of the type-faces which are used in England to-day might be traced back to the origins of the alphabet, but for our purpose it is sufficient to go back to the point where the medieval hands begin to divide into the two groups of gothic and roman. This division was not the work of the early printers, whose aim was to produce by mechanical means something which resembled as nearly as possible the hand-written book. They did not redesign letters, but imitated in type the penwork of the calligraphers. The Gutenberg Bible resembles, and was intended to resemble, a manuscript Bible of the same age. Our books resemble—remotely and modestly—the kind of manuscript which was written for the Italian humanists of the fifteenth century.

When the English Bible was printed in roman type for the first time in 1575, it may be said that our typographers had definitely decided to favour the humanistic design and to abandon the gothic. By that time the competition between the two schools had been going on for some two centuries. We find Petrarch in 1366 complaining of the scribes because they wrote a hand "quasi ad alium quam ad legendum sit inventa." He was attacking the European script, later misnamed gothic, for its lack of legibility. He and the calligraphers whom he employed wrote a rounder hand, with longer ascenders and descenders, which was half-way to the script we know as roman. In recent years this fourteenth-century hand has been given the name of *fere-humanistica*. The men who wrote it and the first printers who cut it as type for texts other than Bibles and Liturgies were abandoning the medieval calligraphic standard of beauty for a standard of legibility. The Italian


LUDOVICUS MAGNUS REX CHRISTIANISSIMUS
PAX PRONUBA
MAR·LUD·AUREL·CAR·II·HISP· REGI COLLOCATA· M·DC·LXXIX·

MARIAGE DE LA REYNE D'ESPAGNE.

IMMEDIATEMENT aprés la Paix de Nimégue, le Marquis de Los-Balbazés vint, avec le caractere d'Ambaſſadeur Extraordinaire en France, demander en mariage, pour le Roy d'Eſpagne ſon Maiſtre, Marie Loüiſe d'Orléans, Fille de Philippe, Duc d'Orléans, & de Henriette, Fille de Charles I. Roy d'Angleterre. Ce mariage fut arreſté au mois d'Aouſt. La cérémonie ſe fit à Fontainebleau, où le Prince de Conti épouſa la Princeſſe au nom du Roy d'Eſpagne.

C'eſt le ſujet de cette Médaille. On voit l'Ambaſſadeur d'Eſpagne qui fait la demande, & le Roy, qui tenant Mademoiſelle par la main, l'accorde à cet Ambaſſadeur. Monſieur, Frére Unique du Roy, Pére de la Princeſſe, eſt préſent. Les mots de la Légende, PAX PRONUBA, ſignifient, *que la Paix a préſidé à ce mariage.* L'Exergue, MARIA LUDOVICA AURELIANENSIS CAROLO SECUNDO HISPANIARUM REGI COLLOCATA. M. DC. LXXIX. veut dire, *Marie Loüiſe d'Orléans, donnée en mariage à Charles II. Roy d'Eſpagne. 1679.*

From "Médailles sur les principaux événements du Règne de Louis le Grand, &c.," Paris, 1702.

humanists of the fifteenth century carried the reform still farther and evolved that hand which we call roman, the most legible of all scripts.

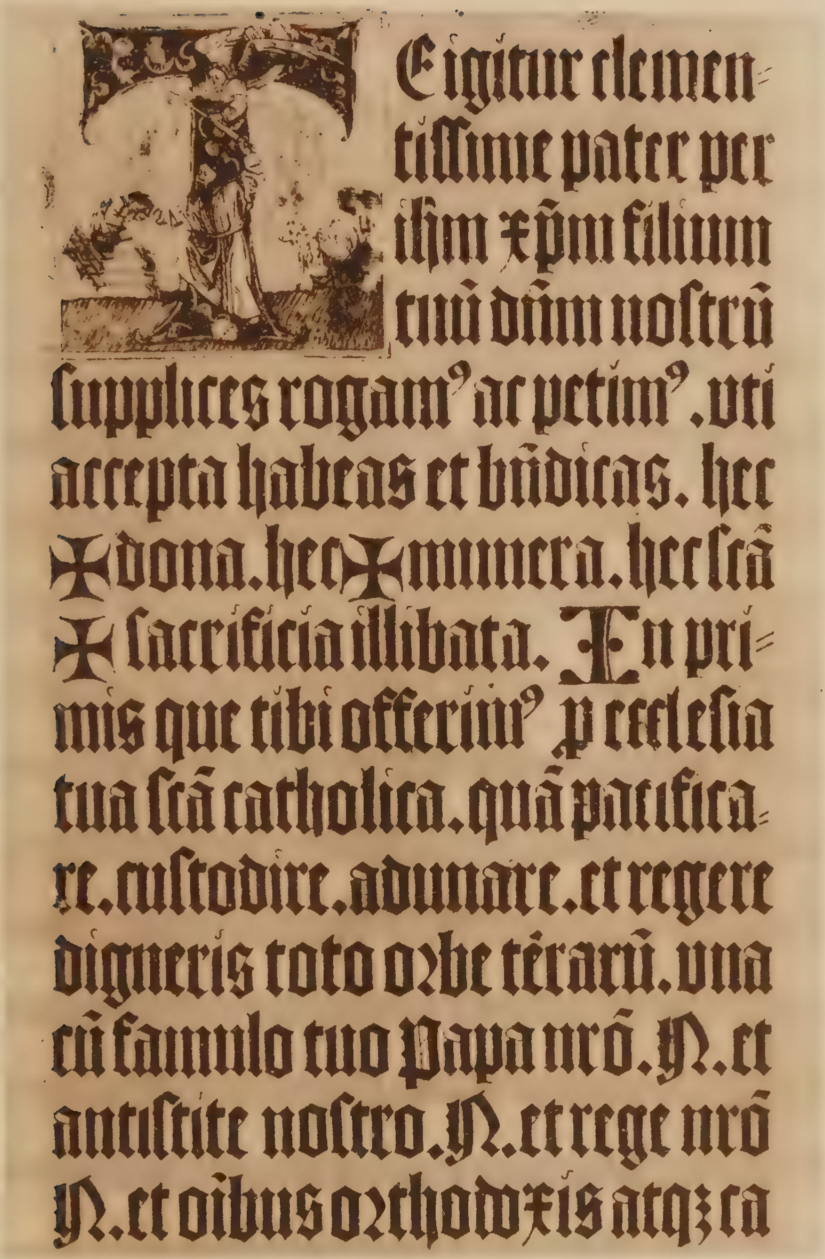
The calligraphers who used the formal gothic hands of the Middle Ages drew their letters with great deliberation. The upright character of the letters, together with the close setting, resulted in a page which resembled a woven pattern (textus); hence the German name Textur and the English word Text. In a book published within the last year, "German Incunables in the British Museum," Mr. Stanley Morison has made a selection of gothic pages which preserve the medieval standard. No corresponding selection of roman pages could be made which would rival the gothic on the score of beauty. We are definitely committed to the standard of legibility.

As early as 1500 the Venetian roman had undergone modifications resulting in a type which is in essentials the design to which we have reverted to-day. The roman types cut by Francesco Griffo for Aldus were the direct ancestors of the French designs of Garamond, which remained the standard European type for two centuries. The Dutch typecutters of the seventeenth century and our Caslon accepted the Garamond design, the old-face. The modern-face, the letter of the nineteenth century and still to-day the letter in commonest use, is the invention of the eighteenth century. Philippe Grandjean, working for the Imprimerie Royale, in 1702 produced the first design which showed a tendency towards the modern-face. His principles were followed up by Louis Luce and Fournier in France, by Baskerville in England, and finally by the end of the century we reach the full development in the "classical" typography of Didot and Bodoni.

The "classical" school derived their design from the lettering of the engravers rather than from calligraphic tradition. They cut flat serifs instead of the old bracketed serifs; they preferred sharp contrasts between the thick parts of the letters and the thin, and refined away the thin parts until they became hair lines. In the round lower-case letters the thickest part was in the centre, as though made with a pen held at right angles to the paper, so that the angle of shading was vertical. In the calligraphic tradition the pen was held at an angle to the paper, the gradation from thick to thin was not abrupt, and the angle of shading was across the page. Even in the heyday of classical printers their principles of letter design did not pass uncriticized. In 1800 one Citizen Sobry read a report to the Société Libre des Sciences, Lettres et Arts de Paris on the letters of the typefounders Gillé, in which he attacked the Didot design both on the score of legibility and of beauty. He pointed out that the exaggerated differentiation of the thick and the thin strokes led to confusion between the *m*, *n*, and *u*, and claimed that the Garamond design was both more easily read and more beautiful.

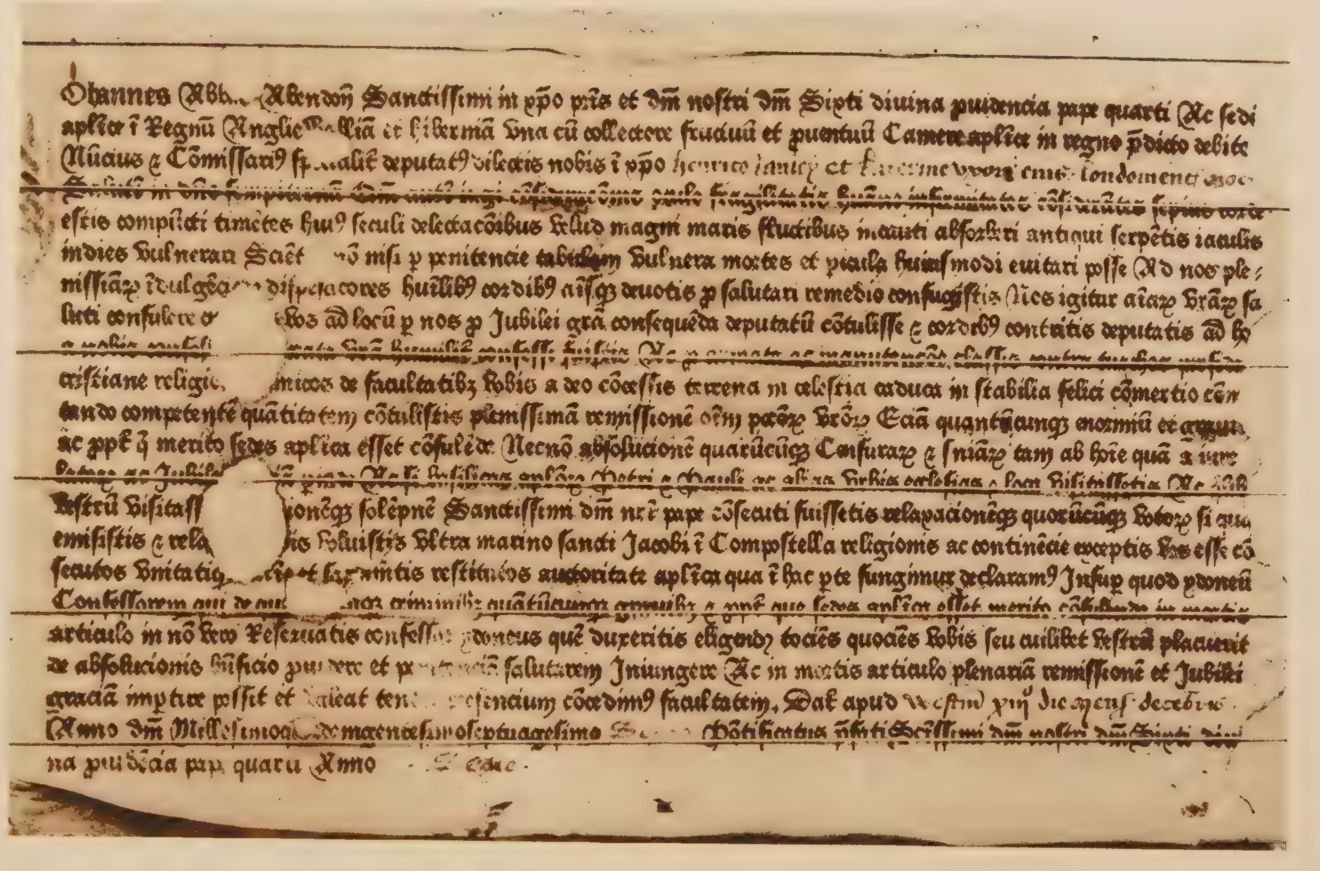
In spite of this isolated criticism the modern-face prevailed. In this country the typography of the nineteenth century is almost entirely modern-face. We had never led the way in typography, and the very fact that we were using roman types at all was probably due to our late development in the art of printing. The earliest roman type in England appeared as late as 1509, and for at least another generation the usual type was the gothic black-letter, a variety of the formal Textur. How was it that this letter did not survive and become the standard for books in the English language, as the cursive and ornamented variety of gothic called Fraktur did in Germany? It seems almost accidental that we have not in this country the same state of affairs that we find in Germany, where the battle is still being fought between Fraktur and roman. The ordinary English book might be printed in a kind of debased Textura, which would certainly be inferior to roman in legibility and not even be able to boast of the superiority in beauty of the earlier gothics. The type would probably be called English and its supporters would take their stand on nationalist grounds, while *The Times* might be the one newspaper set in roman. This is much what has happened in Germany, because in 1500 the Germans were a nation conscious of their importance in European society, and because in the country where the art was invented there was a natural resistance to the use of foreign designs. In the early sixteenth century in cultural matters England still looked to the Continent for guidance. Many of the leading printers were foreigners, and therefore not conscious that there was any English standard to be upheld.

Thus we followed the French and adopted the roman letter. This is now almost our only letter, for the other humanistic script has taken a very minor place. All that our printers ask of italic to-day is that it shall harmonize with the roman, and we are told that it must become little more than an inclined roman. Even when it is cut with this end in view, it is avoided as much as possible by our printers. Yet italic was once an independent letter with a genealogy as ancient as and in some ways more interesting than that of roman. Just because italic was not the principal type, it was less bound by tradition and could vary within wider limits. In origin it is as old as the roman, though later to appear in typography. It was a cursive variety of the humanistic script, adopted



TE igitur clementiſſime pater per ihm xp̄m filium tuū dn̄m noſtrū ſupplices rogamꝰ ac petimꝰ. uti accepta habeas et bn̄dicas. hec ✠ dona. hec ✠ munera. hec ſcā ✠ ſacrificia illibata. In primis que tibi offerimꝰ ꝑ eccleſia tua ſcā catholica. quā pacificare. cuſtodire. adunare. et regere digneris toto orbe tērarū. una cū famulo tuo Papa nr̄o. N. et antiſtite noſtro. N. et rege nr̄o N. et oībus orthodoxis atqꝫ ca

Canon page from Missale Frisingense (Bamberg, Sensenschmidt and Petzensteiner, 1487).



An Indulgence printed by Caxton, and issued to Henry Langley and his wife, Katherine, on December 13, 1476, by Abbot Sant, of Abingdon. It was discovered in the Public Record Office in 1928.

at the Papal Chancery for the inditing of briefs, and was hence originally called Cancellaresca.

Aldus and his type-cutter, the same Griffo who had cut his roman founts, first adapted it as a type; Aldus was attracted by its possibilities as a condensed letter for the printing of a series of pocket classics, with the result that his design is distinguished neither for legibility nor for beauty. Some 20 years later more formal and elegant italics were cut by the writing-masters Vicentino and Tagliente. Vicentino in particular, a writer in the Vatican Chancery and a printer at Rome, designed some handsome founts with a purpose entirely different from that of Aldus. He printed books of verse thought worthy of a beautiful setting and in which speed in reading was not the first consideration. A modern parallel is the edition of Horace printed by the Curwen Press for Peter Davies in Koch Cursiv. Throughout the sixteenth century and for much of the seventeenth italic founts descended from Vicentino's were cut quite independently of roman and used much in the way in which Dr. Henry Daniel used the Fell italic. Originally these founts had a roman upper case and in some cases were perfectly upright. Their essential characteristic was their cursive quality. In our printers' vocabulary the word italic seems to have become synonymous with sloping. The first experiment with inclined capitals was made by a Viennese printer, Johann Singrenius, and it became the traditional custom among the French designers, who have controlled European typography, both roman and italic.

The application of the principles of the modern-face school to italic faces was disastrous. The pinched and wire-like designs which resulted were the death-blow to italic as a separate letter. None would wish to see a whole book set in any italic designed in the nineteenth century. Printers to-day have only one family of types, within which they may make their choice. Although our typographers have cut some of the old-face designs, the habit of using italic has been broken for so long that a revival seems unlikely. A. F. J.

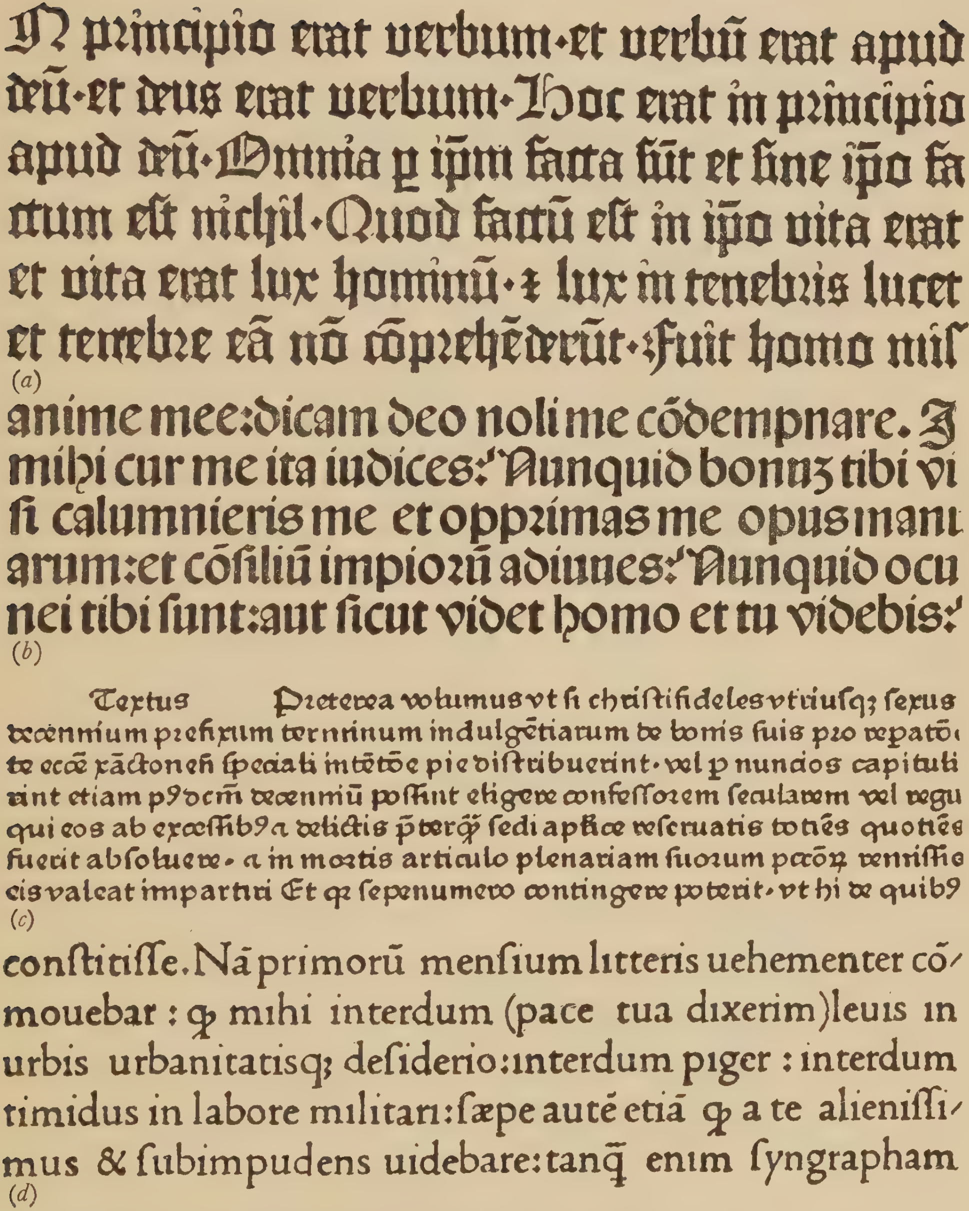
CHAPTER II

TYPES FOR BOOKS

THE EUROPEAN TRADITION

An examination of any recent exhibition of English books, or of any average selection of books published by the houses which make æsthetic claims, will reveal the fact that the types in use to-day are almost all based on designs dating from at latest the middle of the eighteenth century. The popular types are Caslon, Imprint—a modification of Caslon—Plantin, Garamond, Poliphilus, Baskerville, and Fournier, while the nineteenth-century designs have been left to text-books, technical treatises, and newspapers. From this list we can infer that this generation of type-designers has definitely decided in favour of the old face against the modern face, for even the least ancient of these types, Fournier and Baskerville, have more in common with the old face than the modern, although historically they may have led on to Didot. There have been isolated attempts to revive the old face even from the time of the first Charles Whittingham and of Pickering about 1840. The Chiswick Press printed a number of books in Caslon, while William Morris went back to the fifteenth century for his models. Morris in his note on his aims in founding the Kelmscott Press (1895) declared that the essential fault of the ordinary modern type was the thickness and thinness of the lines, which made it difficult to read. But these examples appear to have had no effect on our typography in general at that time, and, in fact, the actual reversal of taste which is now evident is of recent date and is due to a group of typographers who are still at work.

The motives which have led to this deliberate choice are in the main two—one æsthetic, and the other a question of legibility. It might be supposed that we could establish by experiment which types are most legible, but recent investigations to this end have resulted in no very definite conclusions. The problem has proved to be extraordinarily complex, and some inquirers have reached the not very helpful verdict that it is the types with which we are most familiar that are the most



In principio erat verbum·et verbū erat apud
deū·et deus erat verbum·Hoc erat in principio
apud deū·Omnia ꝑ ipm̄ facta ſūt et ſine ip̄o fa
ctum eſt nichil·Quod factū eſt in ip̄o vita erat
et vita erat lux hominū·ꝛ lux in tenebris lucet
et tenebre eā nō cōprehēderūt·:Fuit homo miſ

(a)

anime mee:dicam deo noli me cōdempnare. J
mihi cur me ita iudices:'Nunquid bonuꝫ tibi vi
ſi calumnieris me et opprimas me opus manu
arum:et cōſiliū impiorū adiuues:'Nunquid ocu
nei tibi ſunt:aut ſicut videt homo et tu videbis:'

(b)

Textus Preterea volumus vt ſi chriſtifideles vtriuſq; ſexus
decennium prefixum terminum indulgētiarum de bonis ſuis pro reparatō
de ecclē ꝛactione eī ſpeciali intētōe pie diſtribuerint· vel ꝑ nuncios capituli
rint etiam p9dcm̄ decenniū poſſint eligere confeſſorem ſecularem vel regu
qui eos ab exceſſib9 ꝛ delictis p̄terꝙ̄ ſedi apl'ice reſeruatis toties quotiēs
fuerit abſoluere· ꝛ in mortis articulo plenariam ſuorum peccōꝝ remiſſio
cis valeat impartiri Et qꝛ ſepenumero contingere poterit· vt hi de quib9

(c)

conſtitiſſe.Nā primorū menſium litteris uehementer cō/
mouebar : ꝙ mihi interdum (pace tua dixerim)leuis in
urbis urbanitatisq; deſiderio:interdum piger : interdum
timidus in labore militari:ſæpe autē etiā ꝙ a te alieniſſi/
mus & ſubimpudens uidebare:tanq̄ enim ſyngrapham

(d)

FIFTEENTH-CENTURY TYPES.—(*a*) Pointed text; (*b*) Rounded text; (*c*) Fere-humanistica or Gotico-antiqua; (*d*) Roman.

WHEN we begin to reflect on the course of human thought as a whole, we are struck *at the very outset* by the fact that, while the chief problems seem largely to remain the same, the way in which they are approached, and even the subjects which they involve, constantly tend to develop.

(*a*)

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(*b*)

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(*c*)

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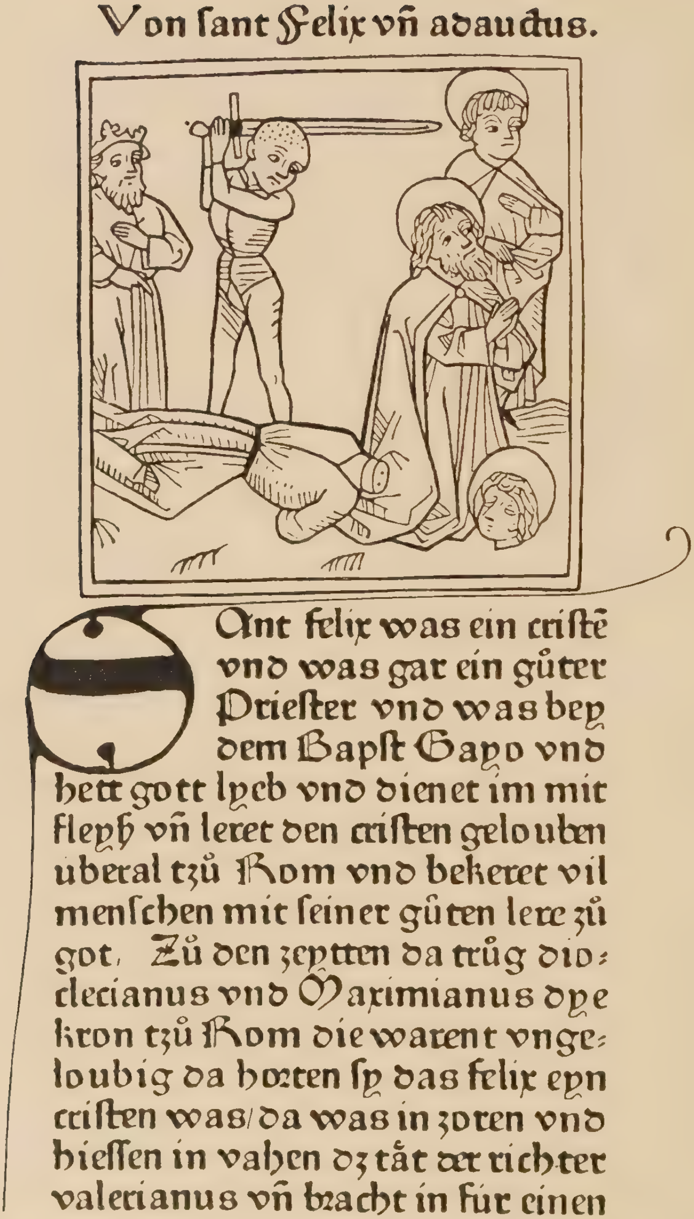
(*d*)

EIGHTEENTH-CENTURY TYPES.—(*a*) Caslon; (*b*) Baskerville; (*c*) Fournier; (*d*) Bodoni.

easily read. Within certain wide limits something has been done; that roman is more legible than Fraktur and that the hair lines of the extreme versions of the modern face make reading difficult are points which may be regarded as established. But beyond that the question is still in a state of uncertainty on the experimental side. That the classical design is æsthetically inferior to the old face is, of course, purely a question of what is called taste. At any rate, it appears to be the conviction of those who are responsible for our typography. Bodoni and his school broke with calligraphic tradition and based their designs on the lettering of the engravers rather than on the hands of penmen. Our generation holds that strokes produced by the natural movement of the pen are more restful and more pleasing to the eye than the more artificial designs which result from the use of the burin. The fact that classical types have retained their popularity in some Continental countries is partly to be explained by national bias. Bodoni was preeminent in his own generation, and his technical achievement was so great that he has overshadowed Italian printing ever since. In France, too, the fame of the Didots has tended to prolong the classical tradition. But in this country no great name has stood in the way of our return to Caslon and later to Baskerville. After the lapse of a century we have reverted to the sound European tradition. But it may be said that present-day designs are not original and are not representative of our age.

So-called "period" printing—that is to say, the production of books resembling in all respects those of another period—is rightly condemned, and it may be objected that the whole of our typography is imitative. Some mistakes certainly seem to be due to a servile copying of early designs even in their faults. In the Garamond types, for instance, we find an italic in which the upper case will not combine satisfactorily because the shortcomings of the original have been faithfully repeated. The notion that a design of a certain period is especially suited to texts relating to that period or to an author whose style savours of the same epoch may account, for example, for the use to which Cochin, a modern French type based on the lettering of an eighteenth-century engraver, has been put. Such a practice is "period" printing. Type is a medium, and should efface itself. Many novels of to-day are being printed in Baskerville, and quite fittingly, because that design, whatever the date of the original fount, is in accordance with the standard tradition. If school books and technical treatises are still being printed in modern face, it is not because the design is peculiarly adapted for such purposes, but because it is the custom of the trade.



Von ſant Felix vñ adauctus.

Sant felix was ein criſtē vnd was gar ein gůter Prieſter vnd was bey dem Bapſt Gayo vnd hett gott lyeb vnd dienet im mit fleyß vñ leret den criſten gelouben uberal tzů Rom vnd bekeret vil menſchen mit ſeiner gůten lere zů got, Zů den zeytten da trůg dioclecianus vnd Maximianus dye kron tzů Rom die warent vngeloubig da horten ſy das felix eyn criſten was/ da was in zoren vnd hieſſen in vahen dz tåt der richter valerianus vñ bracht in fur einen

Part of a page from Jacobus de Voragine, "Leben der Heiligen," Augsburg, Günther Zainer (1472).

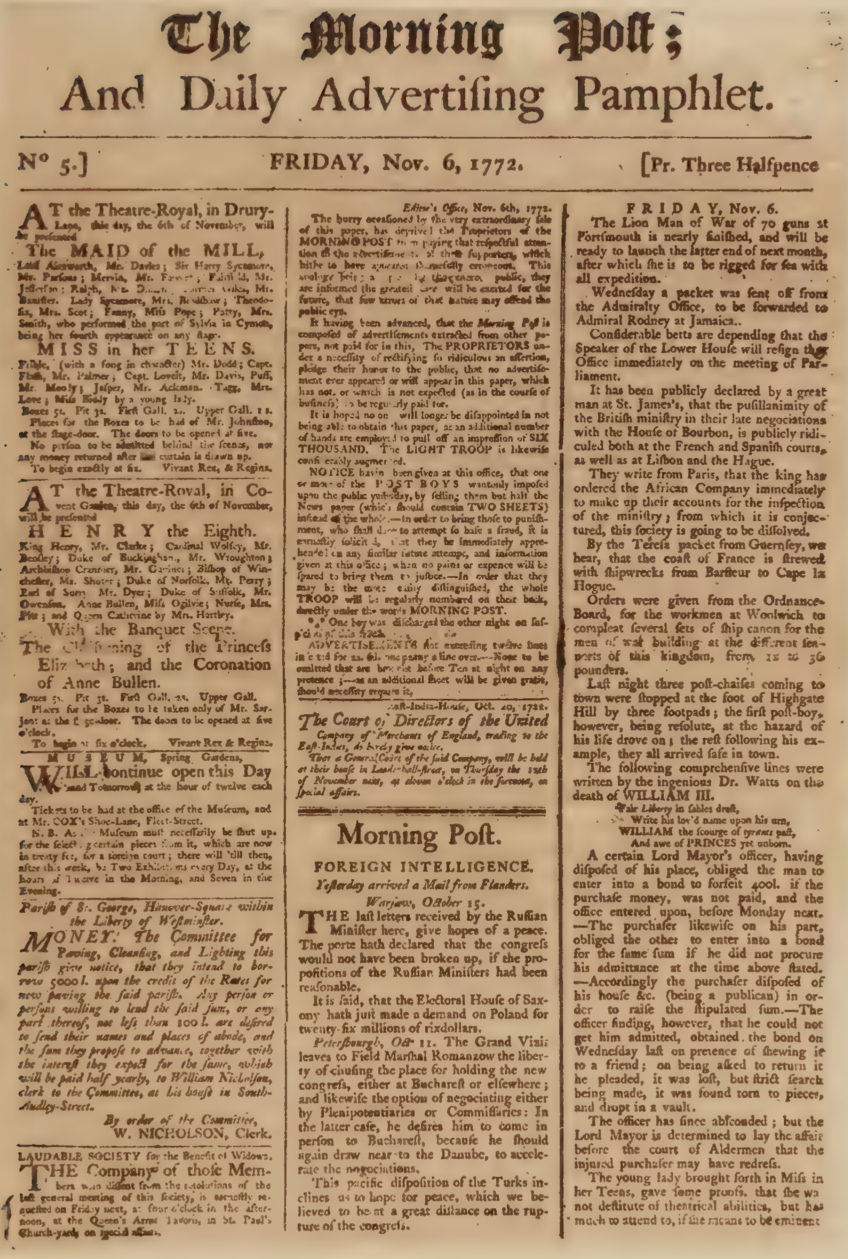
As to the main accusation of lack of originality, it should be borne in mind that a fount of type is a medium and not an end in itself. The design of the alphabet is ruled by the tradition of centuries, and any departure from the tradition outside certain limits must have the effect of calling attention to the medium itself, of interfering between the author and the reader instead of facilitating their communication. Subtle changes such as the modification of the serif formation or of the distribution of colour do not distract the eye. In fact the reader who has paid no thought to type-design, although he can see at a glance that a page set in Caslon differs from a page set in Scots roman, will find it difficult to explain what constitutes the difference. But when he meets an unusual letter the case is altered. In a new German type, the Mainzer roman, used by the Gutenberg Gesellschaft, there is a curious ligatured *au*, not unpleasing in itself; but when the reader comes to this form he is immediately pulled up—the process of comprehending the text is interrupted. Waywardness in letter-design may have scope in the field of publicity types, or for occasional use in the setting up of a classic, where speed or ease in reading is not the first consideration; but in the designing of an ordinary book-type there is much to be said for conservatism. Free-lance type-designing has been seen in Germany more than in any other country, and the result is not altogether attractive.

However, types can and are being cut which are in agreement with the desired standard and yet are not mere imitations of any earlier designs. Herr C. H. Kleuken's Mainzer already mentioned is in the main an example, and others are Mr. van Krimpen's Lutetia, which has been used in this country, and the Pastonchi face, designed by an Italian but cut by the Lanston Monotype Corporation. These three examples of recent European type-designing are perhaps the forerunners of a genuine twentieth-century typography. One may predict that it will be international and will have its roots in pre-classical designs, without being merely a reproduction of the past.

English printing to-day is characterized by its conservatism and by a moderation which perhaps verges on the monotonous. Some of our best printers appear to be satisfied with the use of a very few designs. To them the problem for the printer is not so much one of selecting a type, but of how to use one or other of a few standard faces. The work of the Shakespeare Head Press well illustrates this English attitude. The number of different types used by their typographer is surprisingly small, but the results obtained by careful thought and sound craftsmanship have won general admiration.

But in the case of the average well-printed book in this country—and there are many well-printed books—there is a certain monotony in the composition of title-pages and in the entire absence of decoration. The typical English title-page of to-day is above all restrained. It is brief, simple, and a large proportion of white space is left. If the policy is deliberate, and if the title-page is to efface itself as much as any page of the book, the logical conclusion would seem to be its complete elimination. Our printers seem to be afraid of committing a *faux pas*, and in their very modesty and dread of the hackneyed have become somewhat anæmic. Possibly the kind of ornament which Mr. Dwiggins has recently been cutting in the United States will lead to a revival of typographic decoration, and, together with the restoration of wood-engraving, will add a little colour to our rather pallid typography.

Type-designing in the future may be aided by a wider interest in the subject on the part of readers, and we may expect to see this interest fostered. Hitherto printers have not thought it necessary to give information as to the type used in a particular book. The ordinary reader, unless he is a collector of the expensive and limited editions of special presses, is not supposed to be interested in such matters. He may be told that his book is printed at Frome or at Bungay, but not, for example, that it is set in Monotype Fournier. The admirable reviews of types which have appeared in the pages of the *Fleuron* are a new branch of criticism which one would like to see continued. We may look forward to the day when the literary reviews will discuss a new type as a matter of course. The typefounders in issuing specimens of their new designs have in the past rarely explained the genesis of the type. They have been content to give it a puff, and have perhaps added a historical account of its original parent. Mr. Graily Hewitt in "The Pen and Type Design" has written for the First Edition Club an extraordinarily interesting narrative of his aims and principles in designing his new Treyford type. Even in the trade the Lanston Monotype Corporation in their specimen book illustrating Pastonchi have shown that the production of a new design need not be wrapped in mystery. They have explained something of what was in the mind of the designer, and revealed some of the difficulties with which he and the type-cutters were faced. The book-buying public is showing more and more interest in these matters, and is willing to be educated. A. F. J.



The Morning Poſt;

And Daily Advertiſing Pamphlet.

N° 5.] FRIDAY, Nov. 6, 1772. [Pr. Three Halfpence

AT the Theatre-Royal, in Drury-Lane, this day, the 6th of November, will be preſented

The MAID of the MILL,

Lord Aimworth, Mr. Davies; Sir Harry Sycamore, Mr. Parſons; Mervin, Mr. Fawcet; Fairfield, Mr. Jefferſon; Ralph, Mr. [illegible]; Farmer Giles, Mr. Baniſter. Lady Sycamore, Mrs. Bradſhaw; Theodoſia, Mrs. Scot; Fanny, Miſs Pope; Patty, Mrs. Smith, who performed the part of Sylvia in Cymon, being her fourth appearance on any ſtage.

MISS in her TEENS.

Fribble, (with a ſong in character) Mr. Dodd; Capt. Flaſh, Mr. Palmer; Capt. Lovet, Mr. Davis, Puff, Mr. Moody; Jaſper, Mr. Ackman. Tag, Mrs. Love; Miſs Biddy by a young lady.

Boxes 5s. Pit 3s. Firſt Gall. 2s. Upper Gall. 1s.

Places for the Boxes to be had of Mr. Johnſton, at the ſtage-door. The doors to be opened at five.

No perſon to be admitted behind the ſcenes, nor any money returned after the curtain is drawn up.

To begin exactly at ſix. Vivant Rex, & Regina.

AT the Theatre-Royal, in Covent Garden, this day, the 6th of November, will be preſented

HENRY the Eighth.

King Henry, Mr. Clarke; Cardinal Wolſey, Mr. Bensley; Duke of Buckingham, Mr. Wroughton; Archbiſhop Cranmer, Mr. Gardner; Biſhop of Wincheſter, Mr. Shuter; Duke of Norfolk, Mr. Perry; Earl of Surry, Mr. Dyer; Duke of Suffolk, Mr. Owenſon. Anne Bullen, Miſs Ogilvie; Nurſe, Mrs. Pitt; and Queen Catherine by Mrs. Hartley.

With the Banquet Scene.

The Chriſtening of the Princeſs Elizabeth; and the Coronation of Anne Bullen.

Boxes 5s. Pit 3s. Firſt Gall. 2s. Upper Gall.

Places for the Boxes to be taken only of Mr. Sarjant at the ſtage-door. The doors to be opened at five o'clock.

To begin at ſix o'clock. Vivant Rex & Regina.

MUSEUM, Spring Gardens,

WILL continue open this Day and To-morrow at the hour of twelve each day.

Tickets to be had at the office of the Muſeum, and at Mr. COX's Shoe-Lane, Fleet-Street.

N. B. As the Muſeum muſt neceſſarily be ſhut up for the ſelecting certain pieces from it, which are now in treaty for, for a foreign court; there will 'till then, after this week, be Two Exhibitions every Day, at the hours of Twelve in the Morning, and Seven in the Evening.

Pariſh of St. George, Hanover-Square within the Liberty of Weſtminſter.

MONEY. The Committee for Paving, Cleanſing, and Lighting this pariſh give notice, that they intend to borrow 5000 l. upon the credit of the Rates for new paving the ſaid pariſh. Any perſon or perſons willing to lend the ſaid ſum, or any part thereof, not leſs than 100 l. are deſired to ſend their names and places of abode, and the ſum they propoſe to advance, together with the intereſt they expect for the ſame, which will be paid half yearly, to William Nicholſon, clerk to the Committee, at his houſe in South-Audley-Street.

By order of the Committee,
W. NICHOLSON, Clerk.

LAUDABLE SOCIETY for the Benefit of Widows.

THE Company of thoſe Members who diſſent from the reſolutions of the laſt general meeting of this ſociety, is earneſtly requeſted on Friday next, at four o'clock in the afternoon, at the Queen's Arms Tavern, in St. Paul's Church-yard, on ſpecial affairs.

Editor's Office, Nov. 6th, 1772.

The hurry occaſioned by the very extraordinary ſale of this paper, has deprived the Proprietors of the MORNING POST from paying that reſpectful attention to the advertiſements of their ſupporters, which hitherto have appeared ſhamefully erroneous. This apology being accepted by the generous public, they are informed the greateſt care will be exerted for the future, that few errors of that nature may offend the public eye.

It having been advanced, that the *Morning Poſt* is compoſed of advertiſements extracted from other papers, not paid for in this, The PROPRIETORS under a neceſſity of rectifying ſo ridiculous an aſſertion, pledge their honor to the public, that no advertiſement ever appeared or will appear in this paper, which has not, or which is not expected (as in the courſe of buſineſs) to be regularly paid for.

It is hoped no one will longer be diſappointed in not being able to obtain this paper, as an additional number of hands are employed to pull off an impreſſion of SIX THOUSAND. The LIGHT TROOP is likewiſe conſiderably augmented.

NOTICE having been given at this office, that one or more of the POST BOYS wantonly impoſed upon the public yeſterday, by ſelling them but half the News paper (which ſhould contain TWO SHEETS) inſtead of the whole.—In order to bring thoſe to puniſhment, who ſhall dare to attempt ſo baſe a fraud, it is earneſtly ſolicited, that they be immediately apprehended on any ſimilar future attempt, and information given at this office; when no pains or expence will be ſpared to bring them to juſtice.—In order that they may be the more eaſily diſtinguiſhed, the whole TROOP will be regularly numbered on their back, directly under the words MORNING POST.

⁂ One boy was diſcharged the other night on ſuſpicion of this [illegible].

ADVERTISEMENTS not exceeding twelve lines inſerted for 2s. 6d. one penny a line over.—None to be omitted that are brought before Ten at night on any pretence;—as an additional ſheet will be given gratis, ſhould neceſſity require it.

Eaſt-India-Houſe, Oct. 20, 1722.

The Court of Directors of the United Company of Merchants of England, trading to the Eaſt-Indies, do hereby give notice,

That a General Court of the ſaid Company, will be held at their houſe in Leaden-hall-ſtreet, on Thurſday the 12th of November next, at eleven o'clock in the forenoon, on ſpecial affairs.

Morning Poſt.

FOREIGN INTELLIGENCE.

Yeſterday arrived a Mail from Flanders.

Warſaw, October 15.

THE laſt letters received by the Ruſſian Miniſter here, give hopes of a peace. The porte hath declared that the congreſs would not have been broken up, if the propoſitions of the Ruſſian Miniſters had been reaſonable.

It is ſaid, that the Electoral Houſe of Saxony hath juſt made a demand on Poland for twenty-ſix millions of rixdollars.

Peterſbourgh, Oct. 11. The Grand Vizir leaves to Field Marſhal Romanzow the liberty of chuſing the place for holding the new congreſs, either at Buchareſt or elſewhere; and likewiſe the option of negociating either by Plenipotentiaries or Commiſſaries: In the latter caſe, he deſires him to come in perſon to Buchareſt, becauſe he ſhould again draw near to the Danube, to accelerate the negociations.

This pacific diſpoſition of the Turks inclines us to hope for peace, which we believed to be at a great diſtance on the rupture of the congreſs.

FRIDAY, Nov. 6.

The Lion Man of War of 70 guns at Portſmouth is nearly finiſhed, and will be ready to launch the latter end of next month, after which ſhe is to be rigged for ſea with all expedition.

Wedneſday a packet was ſent off from the Admiralty Office, to be forwarded to Admiral Rodney at Jamaica..

Conſiderable betts are depending that the Speaker of the Lower Houſe will reſign the Office immediately on the meeting of Parliament.

It has been publicly declared by a great man at St. James's, that the puſillanimity of the Britiſh miniſtry in their late negociations with the Houſe of Bourbon, is publicly ridiculed both at the French and Spaniſh courts, as well as at Liſbon and the Hague.

They write from Paris, that the king has ordered the African Company immediately to make up their accounts for the inſpection of the miniſtry; from which it is conjectured, this ſociety is going to be diſſolved.

By the Tereſa packet from Guernſey, we hear, that the coaſt of France is ſtrewed with ſhipwrecks from Barfleur to Cape la Hogue.

Orders were given from the Ordnance-Board, for the workmen at Woolwich to compleat ſeveral ſets of ſhip canon for the men of war building at the different ſea-ports of this kingdom, from 12 to 36 pounders.

Laſt night three poſt-chaiſes coming to town were ſtopped at the foot of Highgate Hill by three footpads; the firſt poſt-boy, however, being reſolute, at the hazard of his life drove on; the reſt following his example, they all arrived ſafe in town.

The following comprehenſive lines were written by the ingenious Dr. Watts on the death of WILLIAM III.

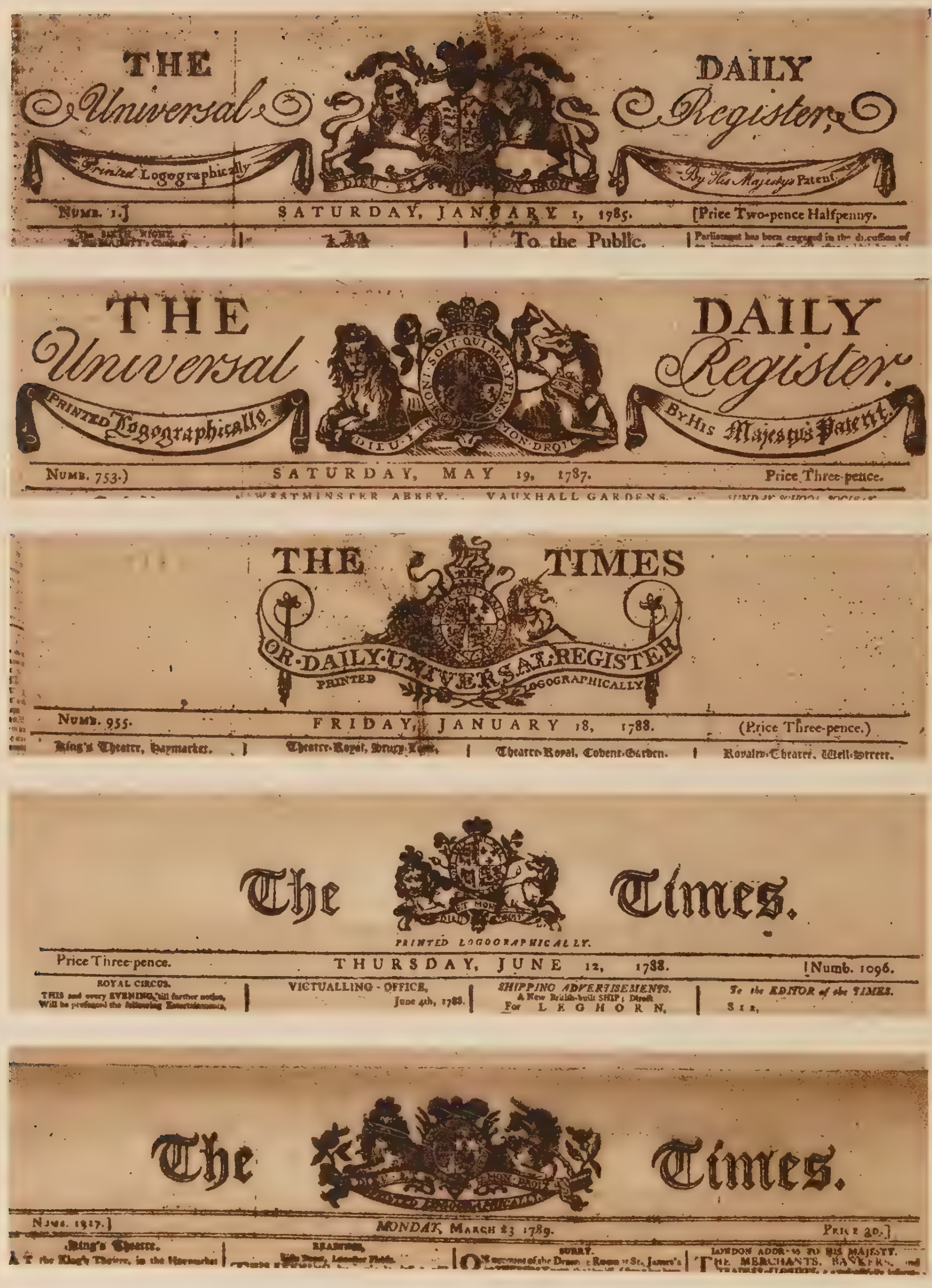
Fair Liberty in ſables dreſt,
Write his lov'd name upon his urn,
WILLIAM the ſcourge of *tyrants* paſt,
And awe of PRINCES yet unborn.

A certain Lord Mayor's officer, having diſpoſed of his place, obliged the man to enter into a bond to forfeit 400l. if the purchaſe money, was not paid, and the office entered upon, before Monday next.—The purchaſer likewiſe on his part, obliged the other to enter into a bond for the ſame ſum if he did not procure his admittance at the time above ſtated.—Accordingly the purchaſer diſpoſed of his houſe &c. (being a publican) in order to raiſe the ſtipulated ſum.—The officer finding, however, that he could not get him admitted, obtained the bond on Wedneſday laſt on pretence of ſhewing it to a friend; on being aſked to return it he pleaded, it was loſt, but ſtrict ſearch being made, it was found torn to pieces, and dropt in a vault.

The officer has ſince abſconded; but the Lord Mayor is determined to lay the affair before the court of Aldermen that the injured purchaſer may have redreſs.

The young lady brought forth in Miſs in her Teens, gave ſome proofs, that ſhe was not deſtitute of theatrical abilities, but has much to attend to, if ſhe means to be eminent

The earliest extant issue of *The Morning Post*, reduced from 4to size. Next week the paper was altered to full size, i.e., folio, under the title of *The Morning Post, or Cheap Daily Advertiser*, later *The Morning Post, or Daily Advertiser*.



THE Universal DAILY Register.
Printed Logographically — By His Majesty's Patent.
NUMB. 1.] SATURDAY, JANUARY 1, 1785. [Price Two-pence Halfpenny.
To the Public.
Parliament has been engaged in the discussion of

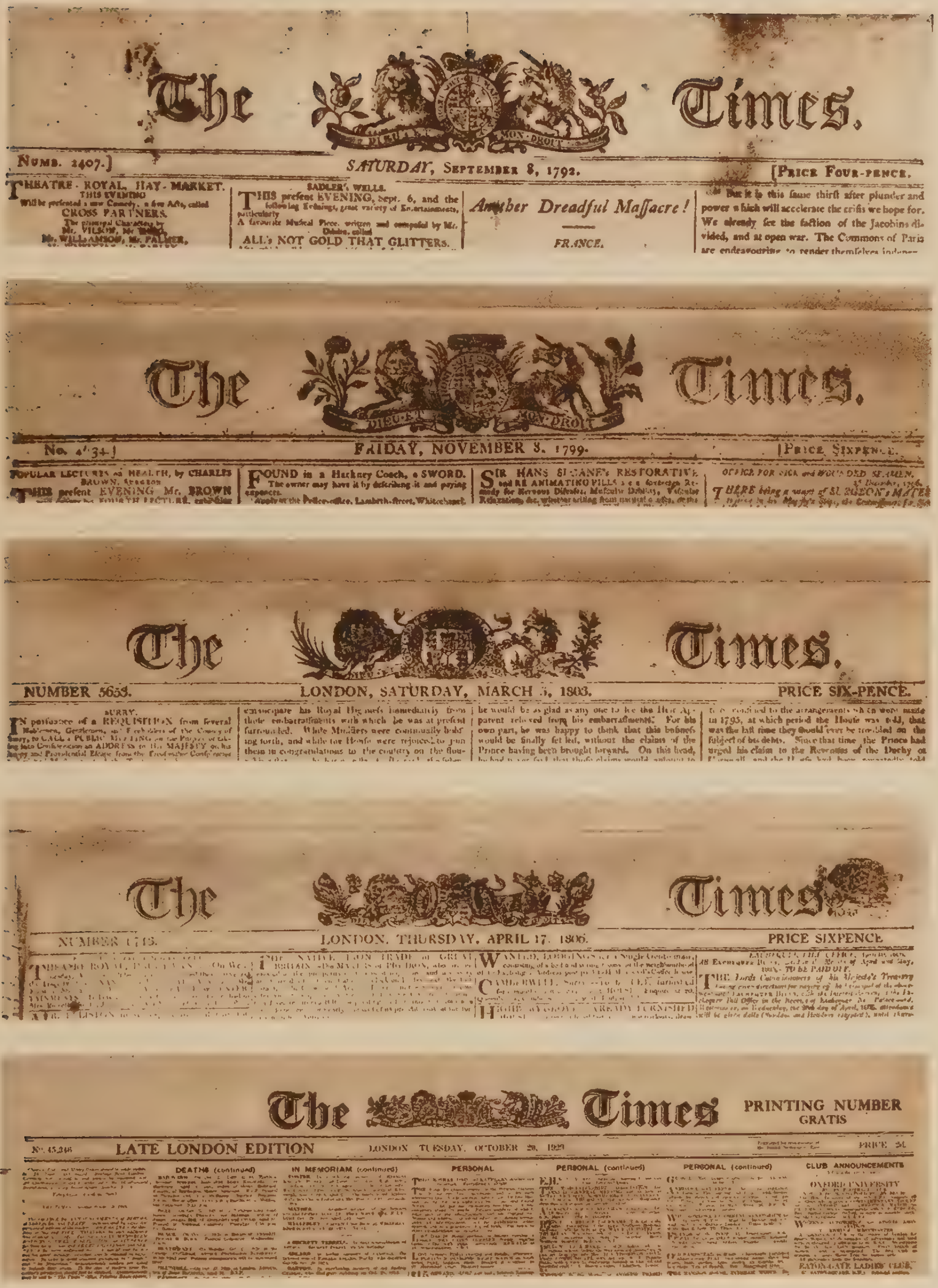
THE Universal DAILY Register.
PRINTED Logographically. — BY HIS Majesty's Patent.
NUMB. 753.) SATURDAY, MAY 19, 1787. Price Three-pence.
WESTMINSTER ABBEY. VAUXHALL GARDENS.

THE TIMES
OR DAILY UNIVERSAL REGISTER
PRINTED LOGOGRAPHICALLY
NUMB. 955. FRIDAY, JANUARY 18, 1788. (Price Three-pence.)
King's Theatre, Haymarket. | Theatre-Royal, Drury-Lane. | Theatre-Royal, Covent-Garden. | Royalty-Theatre, Well-Street.

The Times.
PRINTED LOGOGRAPHICALLY.
Price Three-pence. THURSDAY, JUNE 12, 1788. Numb. 1096.
ROYAL CIRCUS. THIS and every EVENING, till further notice, Will be performed the following Entertainments,
VICTUALLING-OFFICE, June 4th, 1788.
SHIPPING ADVERTISEMENTS. A New British-built SHIP; Direct For LEGHORN,
To the EDITOR of the TIMES. SIR,

The Times.
NUMB. 1317.] MONDAY, MARCH 23 1789. PRICE 3D.]
King's Theatre.
SURRY.
LONDON ADDRESS TO HIS MAJESTY.
THE MERCHANTS, BANKERS, and

Development of the headings of *The Times*, 1785-1789.



The Times.

Numb. 2407.] SATURDAY, September 8, 1792. [Price Four-pence.

THEATRE-ROYAL, HAY-MARKET.
THIS EVENING
CROSS PARTNERS.

SADLER's WELLS.
THIS preſent EVENING, Sept. 6, and the following Evenings, great variety of Entertainments,
ALL's NOT GOLD THAT GLITTERS.

Another Dreadful Maſſacre!

FRANCE.

But it is this ſame thirſt after plunder and power which will accelerate the criſis we hope for. We already ſee the faction of the Jacobins divided, and at open war. The Commons of Paris are endeavouring to render themſelves indepen-

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The Times.

No. 4[illegible]34.] FRIDAY, NOVEMBER 8, 1799. [Price Sixpence.

POPULAR LECTURES on HEALTH, by CHARLES BROWN, Surgeon
THIS preſent EVENING Mr. BROWN

FOUND in a Hackney Coach, a SWORD.
The owner may have it by deſcribing it and paying expences.
Apply at the Police-office, Lambeth-ſtreet, Whitechapel.

SIR HANS SLOANE's RESTORATIVE and RE-ANIMATING PILLS

OFFICE FOR SICK and WOUNDED SEAMEN.

THERE being a want of SURGEON's MATES

The Times.

NUMBER 5653. LONDON, SATURDAY, MARCH 5, 1803. PRICE SIX-PENCE.

SURRY.
IN purſuance of a REQUISITION from ſeveral Noblemen, Gentlemen, and Freeholders of the County of Surry, to CALL a PUBLIC MEETING

emancipate his Royal Highneſs immediately from thoſe embarraſſments with which he was at preſent ſurrounded. While Miniſters were continually holding forth, and while the Houſe were rejoiced to join them in congratulations to the country on the flou-

he would be as glad as any one to ſee the Heir Apparent relieved from his embarraſſments. For his own part, he was happy to think that this buſineſs would be finally ſettled, without the claims of the Prince having been brought forward. On this head,

to the arrangements which were made in 1795, at which period the Houſe was told, that was the laſt time they ſhould ever be troubled on the ſubject of his debts. Since that time the Prince had urged his claim to the Revenues of the Duchy of

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The Times.

NUMBER 1713. LONDON, THURSDAY, APRIL 17, 1806. PRICE SIXPENCE

THEATRE ROYAL

THE NATIVE LOON TRADE of GREAT BRITAIN

WANTED, LODGINGS for a Single Gentleman,

CAMBERWELL.

HIGHBURY GROVE. ALREADY FURNISHED

EXCHEQUER BILL OFFICE,
TO BE PAID OFF.
THE Lords Commiſſioners of his Majeſty's Treaſury

The Times PRINTING NUMBER GRATIS

No. 45,346 LATE LONDON EDITION LONDON TUESDAY, OCTOBER 29, 1929 PRICE 3d.

DEATHS (continued)

IN MEMORIAM (continued)

PERSONAL

PERSONAL (continued)

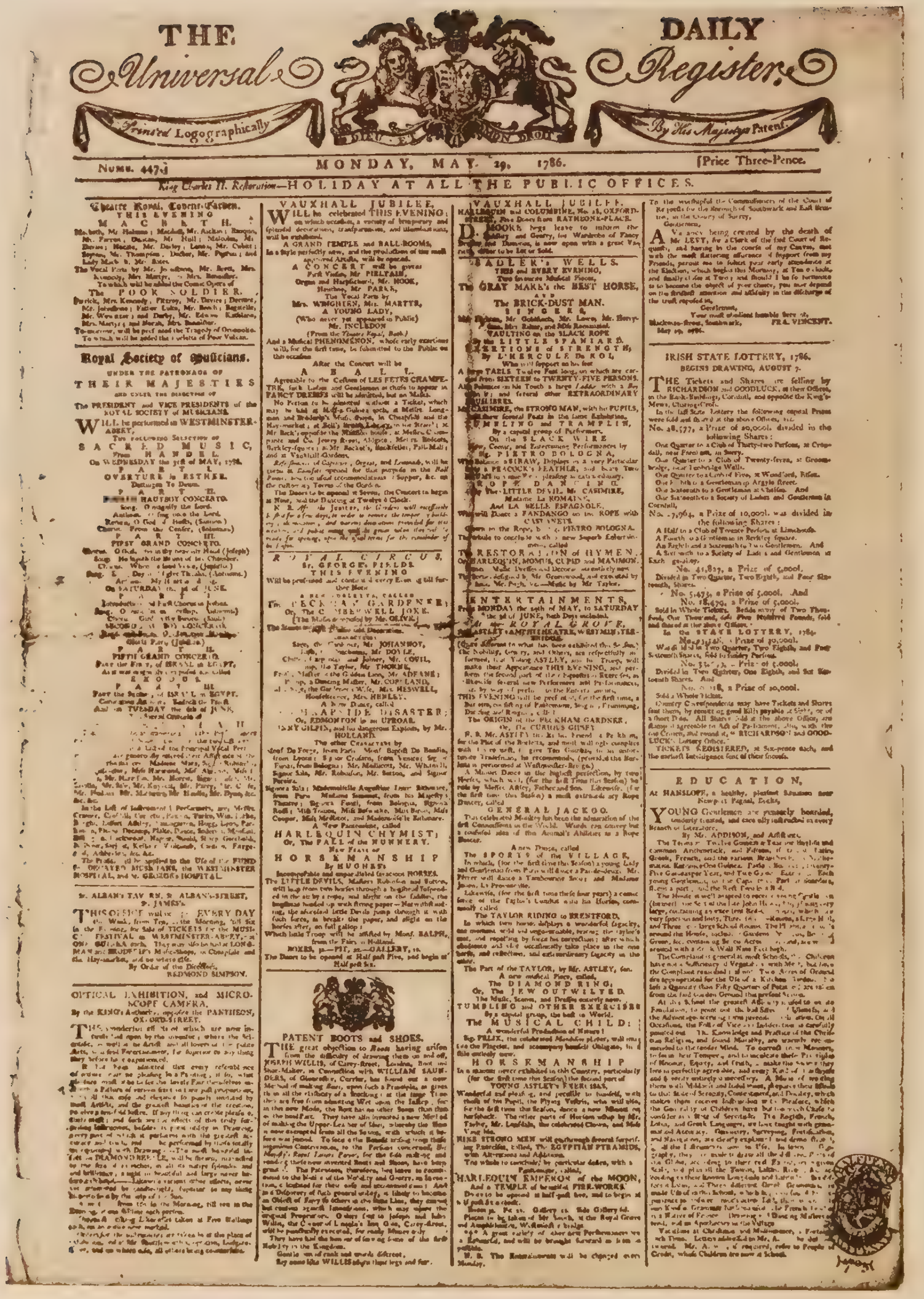
PERSONAL (continued)

CLUB ANNOUNCEMENTS

OXFORD UNIVERSITY

EATON-GATE LADIES' CLUB.

Headings of *The Times*, 1792 to the present day.



THE DAILY Universal Register

Printed Logographically — By His Majesty's Patent

Numb. 447.] MONDAY, MAY 29, 1786. [Price Three-Pence.

King Charles II. Restoration—HOLIDAY AT ALL THE PUBLIC OFFICES.

The front page of the *Daily Universal Register*, subsequently *The Times*.

CHAPTER III

NEWSPAPER TYPES

A STUDY OF "THE TIMES"

The first thing which the observant reader notices in the typography of the editorial and news columns of *The Times* is that the letter-form differs from that of the displayed advertisements of the paper. Inquiry would reveal that *The Times* forbids to advertisers the use of the editorial fount—a measure observed with the less difficulty since few advertisers would now choose the letter. Thus the editorial type acquires a significance which is definitely specific and a function almost liturgical. Not only is the editorial type insulated from contact with type used in the space normally offered for sale, but it is equally cut off from the main fields of typographical endeavour. For, whereas the history of the craft is that of letter-cutting and founding as applied to the printing of books, the history of newspapers is that of mechanical development of the type-setting machine and the power press—the newspapers being left untouched, either by the æsthetic movement of the nineties or the arts and crafts movement represented by William Morris. If this detachment be matter for congratulation, as we think it is, to what man or movement do we owe the design of the type used in the news columns of *The Times?*

The oldest of present-day London newspapers may be taken as a *terminus a quo*. The first number of the *Morning Post, or Daily Advertising Pamphlet* (the sub-title was immediately changed to *Cheap Daily Advertiser*) was published on November 2, 1772, at a time when there was neither separation of book from newspaper nor of news from advertisement typography. Printing of the class-conscious jobbing kind, with "quality appeal," was not thought of. There was one type and one typography; and the *Morning Post* gave the reader an eminently bookish setting in what we should now call "old face," indistinguishable from that of the *Daily Advertiser* and other journals of that day.

The old face, whether Caslon's original or copies by Fry, dominated the composition of books and periodicals for two generations—say, between 1730 and 1790. It was the design which Caslon copied from the Dutch, who had it from Plantin, who was the possessor of punches cut by the originators of the letter, Claude Garamond and Robert Granjon.

The Times (under its original name of *The Daily Universal Register*) first appeared on January 1, 1785, equally set in old face. In that same year there were changes in the proprietorship of the *Morning Post*, which, until that date, had been in the hands of a group consisting, besides auctioneers, of certain modish young men, the Rev. Dr. John Trusler (who also originated the Literary Society, a book club which exactly anticipated the Modern New York Literary Guild, and whose books were printed by John Walter at the Logographic Press), and John Bell, bookseller, of the British Library, in the Strand near Exeter 'Change. Bell left the *Morning Post* in 1786, and with Edward Topham, a young man of means from Eton and Trinity College, Cambridge, founded a journal entitled *The World, or Fashionable Gazette* (January 1, 1787). It was printed under the direction of John Bell at the British Library in the Strand. Bell's interest in printing had been quickened by a visit to Paris in 1785, where he inspected the leading printing offices and made the acquaintance of Moreau-le-jeune, Le Mire, and other eminent artists, besides visiting the most distinguished printing office in Europe, the Imprimerie Royale. This illustrious office, established by Richelieu in 1642, produced in 1702 an elaborate volume on the medals issued during the reign of Louis XIV., with the collaboration of the first engravers of the day—*e.g.*, Berain, who designed borders, Le Clerc, Edelinck, and many others. The types were "nouveaux, dessignez, gravez et fondus par le sieur Grandjean." This, the first *modern* face, owed its origin to the labours of an expert commission of the Académie Royale des Sciences. By 1780 the Grandjean design had been assimilated by the finest Paris printers, and, on his return to England, Bell decided to establish a type foundry for the purpose of making types according to an original design. He established a foundry in his own house at the British Library under the title of the "British Letter Foundry," with Richard Austin as his punch-cutter, and together they produced the first English "modern" face :—

A B C D E F G H I J K K L M N O P Q Q R R S
T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

The capital R, with the curly tail, which Baskerville occasionally used, and Caslon never, originated with Grandjean. Fournier took it, and of course Didot. The short-ranging J, which had been introduced by Grandjean in the *romain du roi* of 1693 and cut by Fournier-le-jeune in 1763, appears here for the first time in England—though Bell gives also the descending sort J. The figures are another novelty; the old-style "hanging" sorts 123456789 are deserted in favour of what printers know as "modern" or "ranging" figures, 123456789.

The engraving of the Bell fount is remarkably good, surpassing in precision all previous English and Continental type-cutting. Bodoni had familiarized the "circles" in England and Europe with a flat serif taken from Grandjean's *romain du roi*, and with sharply contrasted thicks and thins. It is, therefore, much to the credit of Bell and Austin that they should have maintained their independence equally against Bodoni and Baskerville. For all its French inspiration the Bell type looks English and is English because it is conservative, yet not more conservative than it behoved an eighteenth-century type-design to be.

Bell's type possesses a harmony in serif formation as between roman and italic not possessed by French types. In view of Caslon's and Baskerville's founts both possessing cursive italics, it is not remarkable that Bell's italic should possess a similar quality; but, on the other hand, we cannot but be surprised that it is so individual in design. The italic capitals *A V W* perpetuate the error of Caslon, but the face as a whole is not only evenly sloped—that could be said of Baskerville's letter—but, what is new, digests the characteristics of the roman and so unifies the design of the two faces.

This, then, is the earliest English modern-face type. Its first known appearance is in a title to Bell's edition of Pope (in the "British Poets" series) dated 1787. The first general specimen was issued in May, 1788 (see the unique copy in the Bibliothèque Nationale, which Bell presented to Anisson, director of the Imprimerie Royale). Its appearance in newspapers was delayed. *The World* contained a few lines in use as titlings, and, on the break-up of the partnership with Topham, Bell's next invention, *The Oracle or Bell's New World*, included at first no more than a few scattered lines, for *The Oracle* took some time in getting into its stride; but by 1792 it was printed throughout in the new face, thus ranking as the first newspaper to be set in "modern." It was the first paper also to abandon the long *ſ* ſ. Bell's reasons for this innovation are to be found in his preface to the first volume of the Shakespeare of 1788.

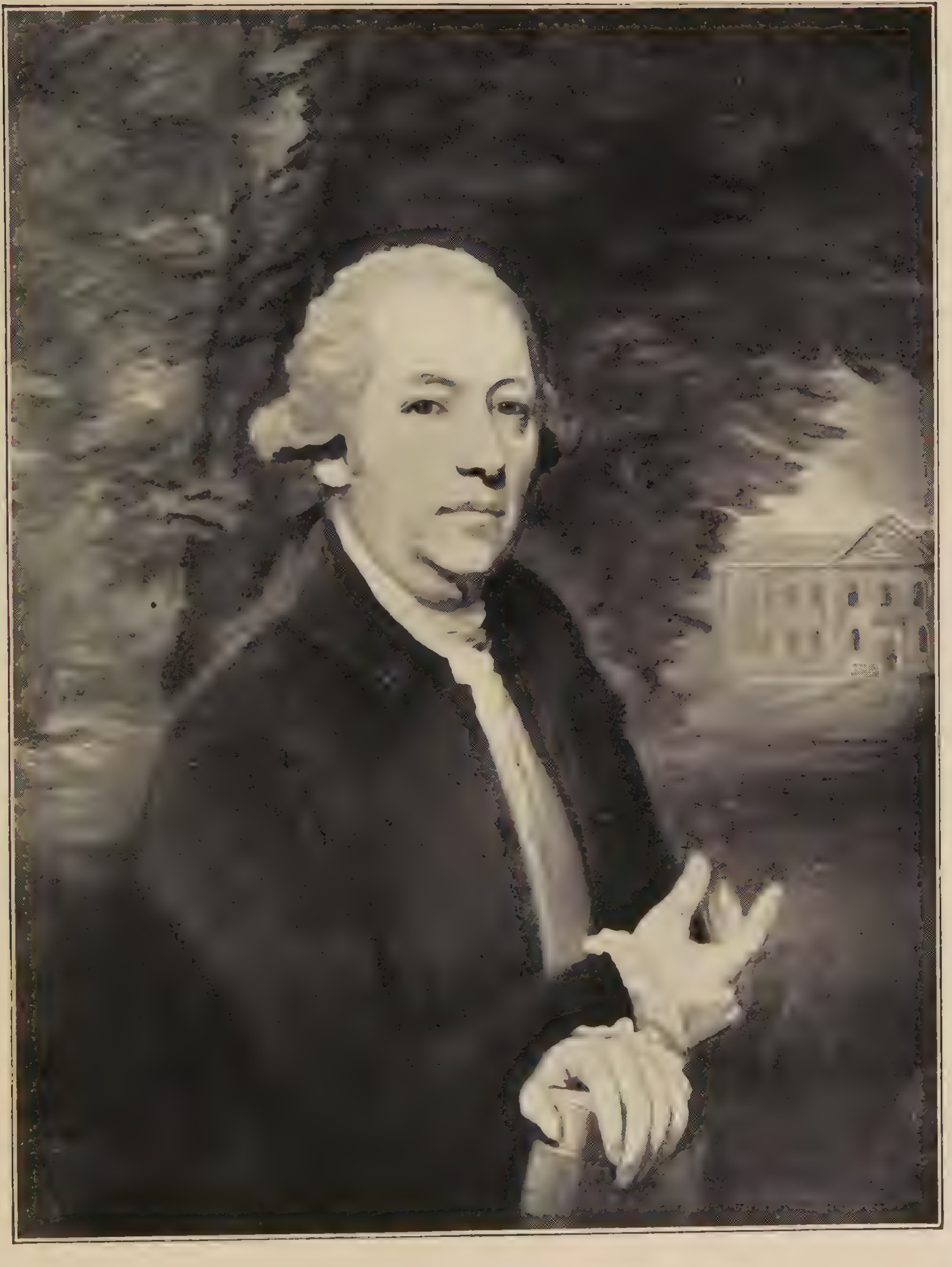
John Bell's novelties were not generally approved in newspaper circles. John Walter had denounced him already as a "vagabond Jacobin" on account of certain dispatches which Bell had sent from the Duke of York's Army in Flanders to *The Oracle*, and a later dispute with John Walter over the typography of the "Life of George Anne Bellamy" inevitably conveyed the impression that Bell was an irresponsible character. The typefounders, however, took a different view, rightly estimating the merits of the Bell type as a design and correctly divining the technical merits of the engraving by Austin.

The Fry foundry made an admirable copy in 1790, in which the thicks and thins were more sharply contrasted. On the dispersal of the British Letter Foundry in 1796, Richard Austin was free to work as a punch-cutter for the foundries of Alexander Wilson and others, so that soon every typefounder possessed a similar face, cut by or after Richard Austin.

It is worth noting that, whatever John Walter's opinion of Bell, *The Daily Universal Register* joined the majority of town journals in bringing its typography into accord with the model which "the self-stiled representative of Apollo" (to quote Walter again) gave them in the first number of *The World*. By May, 1787, *The Daily Universal Register* had adopted one of Bell's most distinctive typographical tricks—*i.e.*, the use of italic capitals for headings to news paragraphs and advertisements. The Bell style was still more nearly approximated in January, 1788, when the paper appeared with the new title *The Times or Daily Universal Register*.

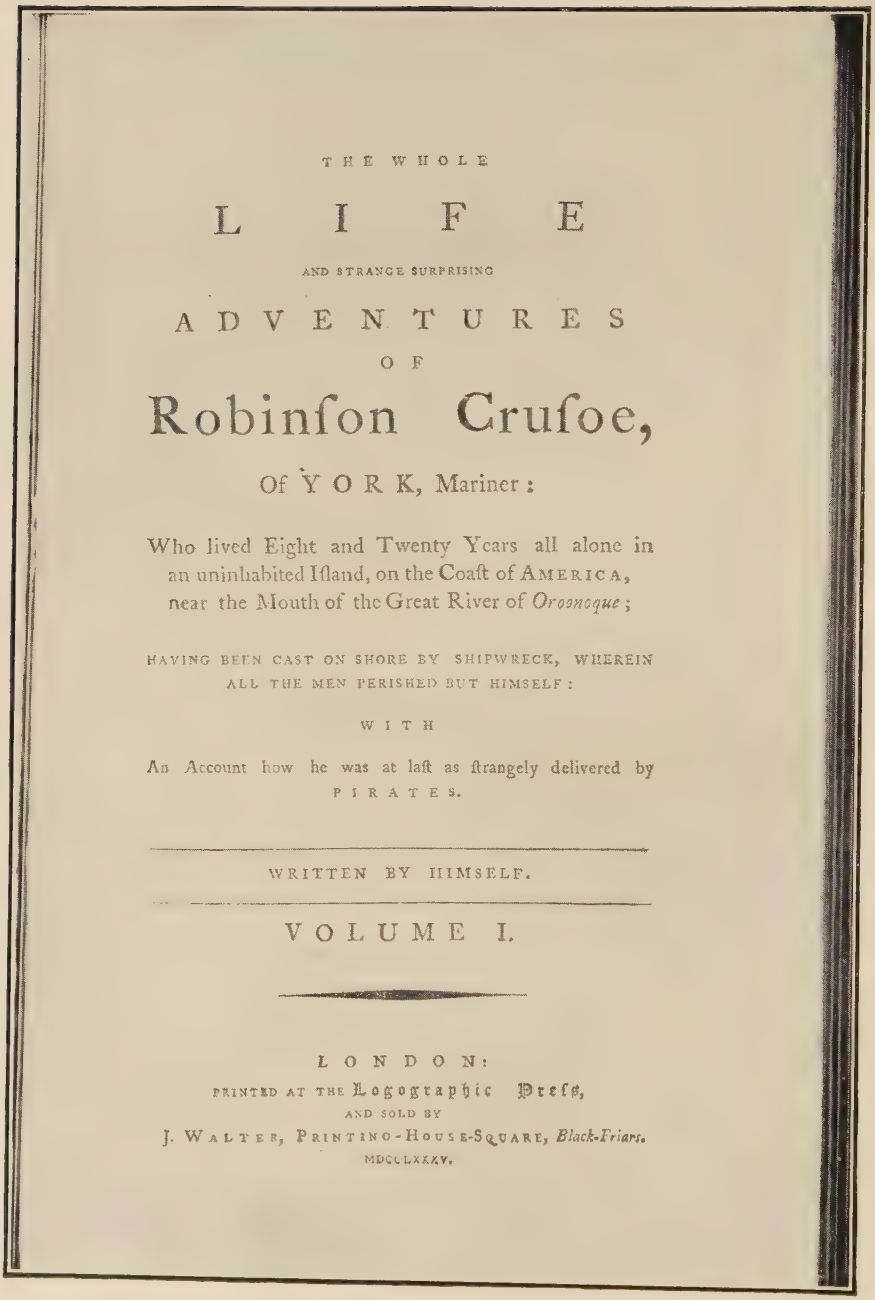
The handsome block for this heading, to all appearances engraved by Richard Austin, who also cut the headings for the *Morning Post*, the *Star* (1788), and the *Sun* (1798), was composed of large roman capitals very closely resembling the Paragon type cast at Bell's British Letter Foundry. In June, 1788, the sub-title was dropped and the single heading *The Times* cut for the first time in gothic ranged with an inferior device of the Royal arms by one of the best London wood-engravers, John Lee. An improved device was substituted the following year, and though there have been several changes in this feature, the heading remains to-day virtually identical with that of 1788. The gothic letters were slightly fattened when the measure of the paper was increased in 1813.

With the issue for November 9, 1799, *The Times* went "modern," using throughout "an entire new and beautiful Type from the Foundry of Mrs. Caslon which we hope will meet with the public approbation."



JOHN WALTER I
(1739-1812)

Facing page 44



THE WHOLE
LIFE
AND STRANGE SURPRISING
ADVENTURES
OF
Robinſon Cruſoe,
Of YORK, Mariner:

Who lived Eight and Twenty Years all alone in
an uninhabited Iſland, on the Coaſt of AMERICA,
near the Mouth of the Great River of *Oroonoque*;

HAVING BEEN CAST ON SHORE BY SHIPWRECK, WHEREIN
ALL THE MEN PERISHED BUT HIMSELF:

WITH

An Account how he was at laſt as ſtrangely delivered by
PIRATES.

WRITTEN BY HIMSELF.

VOLUME I.

LONDON:
PRINTED AT THE Logographic Preſs,
AND SOLD BY
J. WALTER, PRINTING-HOUSE-SQUARE, *Black-Friars.*
MDCCLXXXV.

Title-page (reduced) from the "Robinson Crusoe" printed at John Walter's "Logographic Press," London, 1785.

It was a clean-shaven, sharp-featured type, very similar to that cut by Fry in 1795 and shown below :—

A B C D E F G H I J K L M N O P Q R S T U V W
X Y Z Æ Œ
a b c d e e f g h i j k l m n o p q r r s t u v w x y y z
A A B C D E F G H I J K L M M N N O P Q R S T
U V V W X Y Z Z Æ Æ Œ
a a b c d e f g h i j k l m n o p q r s t u v w x y z æ œ

Other newspapers slowly followed the new fashion, though the *Morning Post* continued in old face for another five years. Some newly established Sunday and other journals continued the old-face tradition, but the type-foundries, realizing that as leaders of the book-printing craft like Bulmer and Bensley printed exclusively in "modern," it was only a matter of time before the whole trade would follow. Quickly and surely the contents of the foundries were revised in accordance with the technical standards of Richard Austin. The principle of fattening the thick lines which William Martin adapted from Bodoni was grafted on to the Bell-Austin tradition, and the types so cut by Alexander Wilson began to influence the newspaper offices of the country. William Miller, foreman of the Wilson foundry, established in Edinburgh in 1809 a foundry of his own, perhaps the first to be entirely devoted to the modern face. It is from this foundry that the present *Times* founts derive, and it is at least possible that they were designed by Richard Austin, for he worked for this foundry among others.

In the difficult task of adapting its office to mechanical type-setting without sacrificing the high standard of hand composition which had been carefully reached and as carefully conserved by generations of conscientious compositors, *The Times* moved slowly. Finally, the original Miller and Richard founts were, with great care, re-cut, first by the Monotype and later by other machine-makers, authenticating the words which Sherlock Holmes addressed to Sir Henry Baskerville and Dr. James Mortimer: "There is as much difference to my eyes between the leaded bourgeois type of a *Times* article and the slovenly print of an evening halfpenny paper as there could be between your negro and your Eskimo . . . a *Times* leader is entirely distinctive." To Sherlock Holmes, indeed, the knowledge of types was one of those elementary branches of knowledge to the special expert in crime, though when he was very young he admits to having confused the type of the *Leeds Mercury* with that of the *Western Morning News*. It was enough to notice differences, for Sherlock Holmes—unlike *The Times*—had no interest in the ideal newspaper type.

The question of an ideal type is, indeed, one of the greatest difficulty, complexity, and risk for any newspaper, and whatever the final result of recently conducted experiments, the type of *The Times* Printing Number of 1929 remains that of its predecessor of 1912.

This book form reprint is set in the type made by the Monotype Company known as "Baskerville."

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y x

It is a round, open and therefore legible type, based upon the design of John Baskerville, the famous printer of Birmingham.

S. M.

CHAPTER IV

MECHANICAL COMPOSING AND CASTING

THE MONOTYPE MACHINE

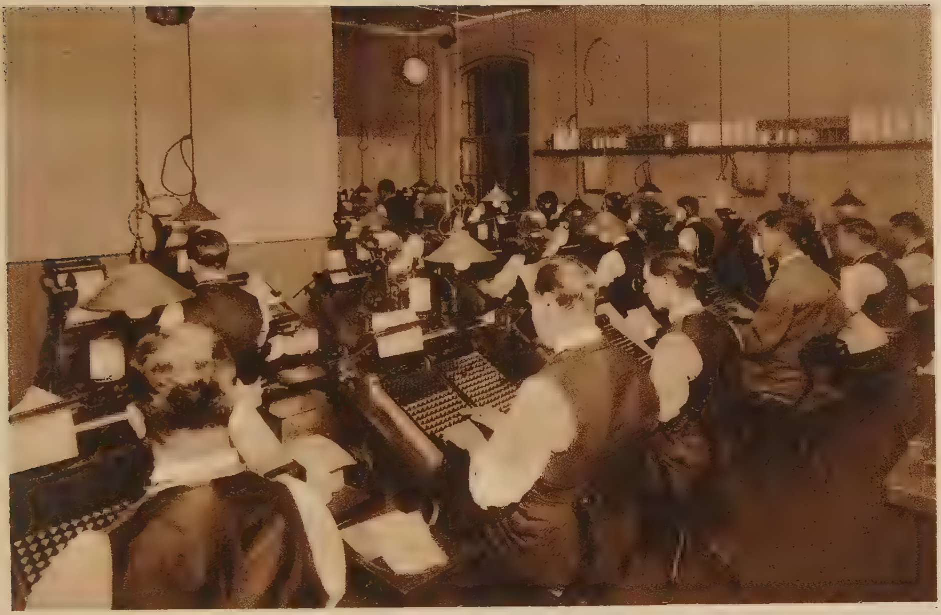
From the year when printing from movable types was invented until the beginning of the nineteenth century no noteworthy advance in the method of making or composing types can be traced in the records of the printing art. Type faces were designed by duly accredited experts, punches were made according to these designs, matrices were made bearing the impress of the punches, and the types were cast (more or less crudely) and then finished by hand. These types were distributed into compartmental trays, and then used over and over again until their faces became so worn and flattened that the impressions taken from them were scarcely readable. The great industrial awakening which characterized the end of the nineteenth century stimulated a demand for every form of mechanical invention, and the slow and cumbrous method of hand composing did not escape the general craze to improve upon every method of production.

Inventors first tried to assemble by mechanical means types that had already been cast by the typefounders, but the problems associated with these methods were from the commercial standpoint insurmountable, chief among them being the difficulty of justifying the lines to even lengths. Several types of machines suitable for composing single types were, however, placed on the market, the justification of the lines having to be done by hand. The distribution of the used types for further use also presented many difficulties which were hardly overcome satisfactorily by the inventors. Owing to these difficulties invention drifted into revolutionary channels, and the idea of mechanically assembling movable types into words and lines was almost abandoned in favour of machines for composing matrices from which were cast complete lines in the form of slugs. So far as the needs of straightforward composing are concerned, success attended the new idea; for it meant that a daily newspaper could be composed by means of a few machines, whereas formerly a large number of compositors was required to do the work, and the stock of types needed was enormous.

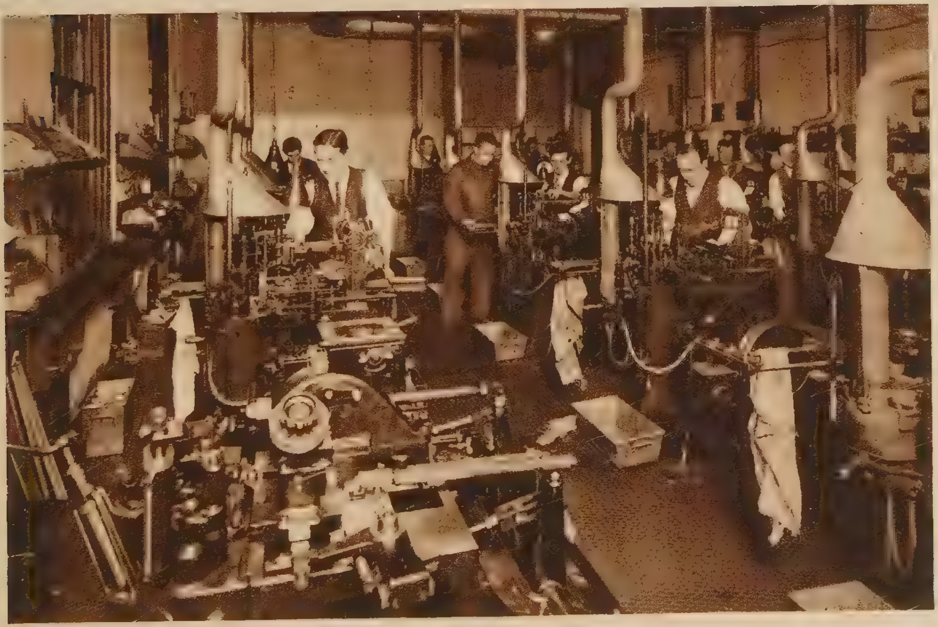
Success, however, was not unqualified. Speed and economy were acquired at the expense of quality and of the sacrifice of many typographical refinements which had become firmly established by splendid tradition. The speed of production was counterbalanced by an increase of typographical errors in composition; and the demand for economy brought about a ruling that minor errors in composition could be ignored in the composing room, since errors meant the recomposition of all lines containing them. The consequence has been that, generally speaking, the daily newspapers of to-day are not presented to the public with that grammatical and typographical excellence which prevailed thirty or more years ago. Four main reasons contributed to this deterioration: (1) A slug cannot be cast with all the individual letters possessing the precision and uniform height of movable type; (2) the cost of slug correction minimizes the gain in output; (3) where corrections are made in a slug line other errors are likely to be made in the new line; (4) corrected slug lines may be placed in the wrong position in the composition.

These inherent disadvantages in what is termed "slug" composition induced inventors to persevere in attempts to produce a machine to compose lines of movable type, and Tolbert Lanston, of Washington, achieved success in this direction by his invention entitled the "Monotype." In designing the Monotype Lanston emerged upon entirely new principles. He separated the processes of composition and casting, introduced perfect line-justification, and abolished distribution. By separating the operations of composing from those of casting, greater output is obtained, and the range of the product is practically unlimited. Owing to the great variety of characters which may be composed at the keyboard, also to the fact that the individual characters are cast to perfect precision in regard to height and width, and again to the fact that corrections are so simply made by hand, the production of the Monotype machine has restored the quality of printing to that high standard of excellence which existed when typography was at its best.

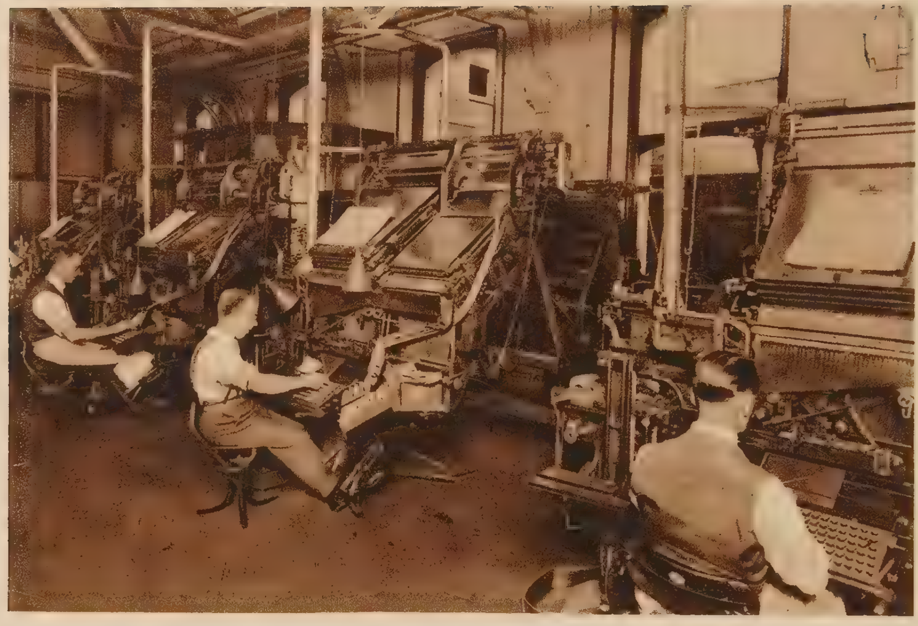
The Monotype consists of two separate machines. The keyboard operator depresses keys similar to those on a typewriter, but instead of printing letters the Monotype keyboard perforates a paper ribbon with a combination of two holes for every letter. With each key depression the paper ribbon is automatically advanced, and at the end of each line special perforations indicate (to the casting machine later on) the



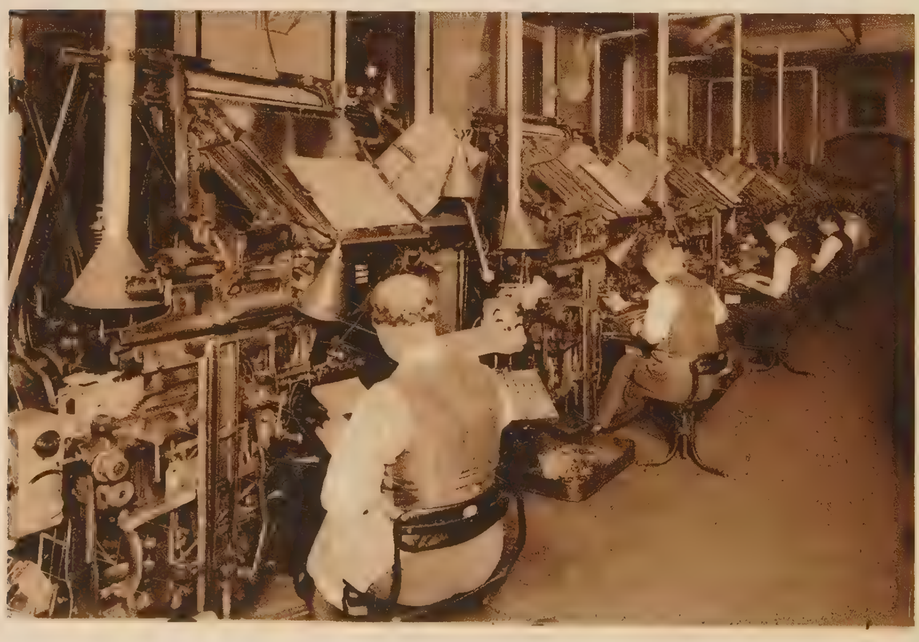
A Monotype Keyboard room at *The Times*.



A Monotype Casting room at *The Times*.



Linotype Machines in the composing room of *The Times*.



Intertype Machines in *The Times* composing room.

exact thickness of spaces which must be cast to make the line correct to a uniform length. When the copy is finished, or when a spool is completed, the perforated ribbon is transferred to the casting machine, where it is automatically cast, and the lines are arranged in proper order ready for proofing. The casting takes place at the rate of 150 to 160 types per minute. To quicken the cooling of the molten metal a trickle of water runs through the mould.

The great feature about the Monotype, apart from the high quality of its product and its great output, is its capacity to produce composition of the most intricate nature; in fact, there is no composition too difficult profitably to be given to the Monotype operator, and composition may range from the smallest type in use to 24 point, and the line length may be anything up to 10in. As an example of the intricate composition that it is possible to produce on the Monotype composing machine the new "Roadways" time-table may be cited. This is a production packed with tables spread over 900 pages, and was composed and cast on this machine. The type faces include several alphabets and a great variety of figures. Even all the vertical rules were composed as ordinary matter. It is a production which testifies to the development of mechanical composition.

In addition to the value of the Monotype as a composing machine, attachments may be applied for casting type for hand work up to 72 point, and for casting leads and rules, in addition to the usual ornaments and borders. The Monotype is thus a complete foundry machine as well as a composing machine.

THE LINOTYPE MACHINE

The Linotype machine produces type matter without the aid of single types. The type is used once only; for example, new clean type surfaces are produced for every issue of *The Times*. The unit of its product is known as a slug—each slug being a complete line of type. The machine has a number of magazines, each of which contains founts of matrices (or dies). The matrices bear characters in intaglio corresponding to buttons on the keyboard.

The operator by depressing the keys releases the matrices in the order required, together with the necessary spacebands, by means of which the words are spaced. When the line of matrices and spaces is approximately of the length required, it is released and passed on to the casting mechanism, where the line is automatically spaced out to full column width by the raising of the spacebands, which are wedge-shaped. The line is then cast from molten metal, trimmed, and delivered into the galley or tray at the front of the machine. Meanwhile, the matrices and spacebands comprising the line have been separated, and have been automatically returned to their original positions ready for use again. During the sequence of operations further lines are being composed. Thus one line rapidly follows another—while one is being distributed another is being cast and a third being set. After the matter so composed has been arranged into page form and stereotyped, the slugs are re-melted and again used, so that not only is no time lost in distribution but there is no waste of material.

To meet the ever-widening requirements of printers, the Linotype machine has been considerably developed in recent times. Seventeen years ago the majority of Linotype machines were equipped with only one magazine; a few had been built with as many as four magazines, but they were then something of a novelty. Developments in the printing office of *The Times* a few years ago, however, made it desirable to equip its type-setting department with Linotype machines each carrying no fewer than eight magazines. The particular type of machine required was not available at the time, but the Linotype engineers set to work and produced the model specified. The specification provided not only for eight magazines, each to contain two different type faces (such as roman and italic), but for an extra power-actuated keyboard. In addition, the method of changing from one magazine to another had to be reduced to mere key-button control. All these and other similar problems were successfully solved by the engineers, and the result was the construction of a machine known as the model 6 S.M. Linotype. Several of these machines have already been installed in *The Times* Office, and duplicate machines now being constructed in the works of the manufacturers, near Manchester, are being installed as quickly as they can be completed.

During the same period this machine was adapted to set much larger type characters than those used in the text columns of a newspaper, and these machines are now producing large displayed advertisements as well as headings. Beautiful faces specially cut for fine book work have also extended the field of this machine, and some of the best-produced books are now set on the Linotype.

But the progress of the Linotype composing machine has not been confined to purely mechanical development; its range of activities has been extended far beyond the limits conceived by its originators. For example, who would expect to find a Linotype assisting in the production of a newspaper on a train? One of these machines was, however, employed by the National Editorial Association of U.S.A. in the production of a special daily newspaper (the *National Editors' Argus*) during the journey of the associated members through Montana and the National Parks. The paper was printed on a Miehle, and the power required to run the machines was generated by a dynamo operated by the locomotive.

During the Great War Linotype machines were enlisted for active service, not the least important point in their favour being the vast volume of work they could produce compared with the comparatively few men needed to produce it (a matter of extreme importance in view of the secret nature of the many documents needed).

Apart from the Linotypes which were more or less permanently installed on the various fronts, General Pershing's headquarters staff decided to move their printing plant with them from point to point, and their Linotype was placed on a motor truck and became part of a fully equipped printing train operated by the Seventy-ninth Engineers. This train accompanied the General Commanding the American Army throughout their operations during the War in France. At first the machine was heated by petrol, but later on electric heaters were fitted to the metal-pot.

Ten ships in the U.S.A. Fleet along the Pacific Coast have also been equipped with Linotypes, doing their work every day at sea as well as in port. Under more peaceful conditions the Merchant Service has since installed Linotype machines, more particularly in connexion with the publication of daily newspapers on board the large Atlantic liners. When Linotypes were first installed on board ship it was considered desirable to swing them in a cradle; but the machines now installed are bolted to the deck, an arrangement which has proved to be satisfactory even when heavy seas are running. Before the cradle method was abandoned, however, tests were made to see what would happen without their aid. As the operator kept full control of his machine throughout the test and the molten metal in the crucible did not splash over, the cradle was considered to be unnecessary.

One of the first Linotype machines has now been placed in the Science Museum, South Kensington, where it is exhibited next to a 1700 Jacobean composition case frame.

THE STANDARDIZED INTERTYPE MACHINE

In an age which more and more tends to the supersession of handwork by mechanical contrivances it is not remarkable that many efforts have been made to improve upon existing composing machines. The type-setting machine graveyard is strewn with memorials to deceased designs, suggesting that nothing less than a real contribution to progress and efficiency can ensure a permanent place for the newcomer. Because this is so, one naturally looks for outstanding features to account for the success of the Intertype, which has tangible expression in the fact that over 10,000 machines are in use throughout the world. *The Times* was among the earliest users of Intertypes, having installed three of its present battery of 17 machines in 1914.

The name Intertype was suggested by the fact that the machine was first manufactured by the International Typesetting Machine Company, formed in 1912 by a group of composing-machine engineers and designers who were not satisfied with the progress shown by machines then being marketed. Chief among these men was W. S. Scudder, who, it is interesting to note, had previously worked under Ottman Mergenthaler in the early stages of line-composing machine development. In designing the Intertype Mr. Scudder and his associates struck across the existing practice in that they applied the principles of standardization and interchangeability to composing machines. Whereas the method practised by other manufacturers has always been to build new "models" when improvements in design or extension of scope became necessary, Intertype standardization made it possible for the printer to acquire a composing machine with only the equipment needed at the time of purchase, and add further standardized units of equipment as they become necessary. Improvements made from time to time are also standardized and can be fitted to outstanding machines. Thus the Intertype does not become obsolete and the printers' capital investment is safeguarded from undue depreciation.

Intertypes can be equipped with one, two, or three main magazines, and side units with one or three side magazines may be added to any type of machine. A "mixer" equipment is also available enabling matrices from more than one main as well as side magazines to be mixed together in one line if necessary. The versatility of the machine is such that practically any kind of composition, from newspapers to complicated dictionaries or directories, from pamphlets to displayed advertisements, can be composed directly from the keyboard. Standardization, though perhaps the most far-reaching and revolutionary, is only one of many improvements, some of which make for speedier operation, others for the prevention of stoppages in working, and yet others for economy in upkeep.

THE TYPOGRAPH MACHINE

Mechanical composition postulates the casting of type either in single letters, in words, or lines of words. The quickest and most easily handled form is that of lines, which are known technically as "slugs." The machine which casts these slugs must therefore be either very elaborate or very ingenious. In the stage which engineering has now reached almost anything can be done by mechanical means. It may not always be done either economically or efficiently, and it is in obtaining the two latter desiderata that human ingenuity comes into play. In probably no machine has this been more clearly evident than in the Typograph composing and line-casting machine. Simplicity in design and in mechanical operation has the great advantage of reducing the number of parts and therefore the amount of wear.

The Typograph machine has substantially retained both its original appearance and the sound and simple principles which originally characterized it. It has, however, added during the last twenty years many important improvements, which are embodied in the new "Universal" model. The principle adopted is to produce the same high quality as a typefounder by casting the slug correctly to body size, in respect to both length of line and height-to-paper, in a water-cooled mould; by breaking off the "tang" at a point above the foot of the slug; and by eliminating entirely any cutting or trimming of the slug which would affect any of the named dimensions. The many advantages of this slug are that it reduces the risk of "pieing," is easily locked up, and time spent in "making ready" is reduced to a minimum. The principle of casting is the same as in all line-casting machines.

The mould in which the line is cast determines the body size of the slug, and in cases where leading is required it is possible to cast an eight-point letter on a ten-point body and thus save leading the composition. Change of type both in face and body size is carried out by means of racks fitting on to the magazine. The Typograph is the only machine which will allow any face or body size to be set by means of one "Universal" magazine. Display type up to 36 point can now be set on the machine, and a wide variety of border and ornament is also available.

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THE LUDLOW MACHINE

The Ludlow machine and system is for producing type in slug lines from hand-set matrices, in type sizes from 6 point up to full-width 72 point, and even 84 point caps. Thus it performs for display work and the setting of headlines what the Linotype does for solid small type text matter. It is true that a Linotype display machine can also deal with such work in a wide range of styles and sizes by means of extra magazines for the matrices, but the simplicity of the Ludlow system, its economy and convenience, with low initial cost, are all points in its favour. The matrices are stored in cases much the same as for type, and the operator sets up matrices in a special form of composing "stick." When the line is completed, spaced, and justified he turns to the Ludlow machine, clamps the stick of matrices into place, and touches the starting lever. The slug is quickly cast and trimmed to type high, and the matrices can then be distributed back into the case. The slug is delivered on a galley in front of the machine, and the assembled slugs are quickly and easily made up into formes. An all-slug forme cannot "pie"; it can be lifted by one hand and carried about like a solid block. More than 500 faces are available, in all sizes, so that the system provides as complete a range as founders' type, with the difference that the type face cast by the Ludlow is always new, the metal going back into the melting-pot after use.

Several unit slugs can be joined end to end to make wider lines than the machine will cast. The system can also be extended to produce rule work with both horizontal and vertical lines, for invoice forms, &c. An important advantage is that when the compositor is casting one line he can quite readily produce a number of duplicates for making up repeat formes, thus saving expense of electrotypes and stereotypes. It would be possible to do job composition entirely by means of the Ludlow without using founders' type. The first cost of the matrices might be more than for an average fount of type, but there would always be the advantages of having a new face for every job, and no distribution, besides other economies due to saving delays in hunting for sorts, resetting "pied" lines and formes, and in setting from dirty and depleted cases. From one to four compositors can set up matrices for different jobs without interfering with one another, and each one in turn can cast his stick at the machine.

A companion machine is the Elrod, which casts leads, slugs, and rules.

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THE TYPON PROCESS

Typon is not, strictly speaking, a single process; it is rather a series of processes, any of which may be chosen by the user to suit the work in hand. All, however, have one object in common, that of making flexible negatives or positives of paper or film for use in photo-lithography. Compared with glass plates, the paper and film negatives have many advantages, apart from convenience of handling and elimination of delays through breakages. In particular the film or paper negatives may be used for making up formes of 8, 16, 32, or more pages for the reprinting of books by lithography. A large amount of work is now done in this way for reproducing out-of-print books, the demand for which does not justify the heavy cost of resetting the type. These paper or film negatives may be exposed in the camera or made by a contact exposure in a printing frame, for Typon can be worked either way. In the latter case a sheet of what is known as "Reflex" paper is laid with its sensitive side in contact with the page of the book to be reproduced, and pressed into contact in some form of pressure frame, preferably one of the vacuum type.

Contrary to all the usual photographic processes, it is the back of the sensitive paper which is exposed to light. The effect is that the more or less white paper of the printed page reflects back the rays passing through the sensitive paper base and causes the emulsion to be so affected as to become black when developed. On the other hand, the printed lettering, being black, reflects no light, or practically none, and thus more or less white lettering is produced on the negative paper. The result is not the perfect negative of clear lines or lettering on an absolutely opaque ground which is requisite for the photo-lithographer, but this result is achieved by first making a positive print from the Reflex negative and from this positive making another negative. The curious thing is that the positive print and the final negative are perfectly sharp in spite of the foggy appearance of the first—the Reflex—negative. The final negative can be made either on negative paper or on stripping paper, which yields a film negative by removing the film from the paper backing. It may alternatively be made on the Typon celluloid film, giving the brilliant crystal-like transparency which is characteristic of good film negatives.

Various applications of Typon can be made. For instance, if one has a good proof printed on one side of the paper it can be exposed through on to the strip-film paper or on to a celluloid film so as to produce a negative. Where type-matter or blocks are concerned, a proof can be pulled on Typon proofing paper, and this proof printed through on to strip-film or celluloid film to obtain a negative. Originals printed on both sides of the paper, or on a material through which the light will not penetrate, can be equally well reproduced by using the Reflex process. Thus in various ways the camera can be dispensed with so long as the reproduction is to be the same size as the original. Where reduction is required a more rapid Typon paper or film is used in the camera. There is also an orthochromatic film for copying originals which are yellow or stained, and a further aid in such cases is a yellow screen between the sensitive paper and the illuminant.

PHOTO-COMPOSING MACHINES

The idea of composing textual matter for printing without the use of type has long been the dream of many inventors. The progress of photo-lithography through the growing importance of the offset process directed fresh attention to the subject, because it was strongly felt that it ought not to be necessary to set up a forme of type simply to pull proofs for reproduction by the photo-lithographer. This led various inventors to attack the problem on the lines of combining the typewriter keyboard with the camera so as to compose the "copy" by passing the letters before the lens on striking the keys, and by other mechanism to provide for spacing and justification. Of the numerous ideas put forward only three have been carried to a stage showing promise of ultimate practical usefulness.

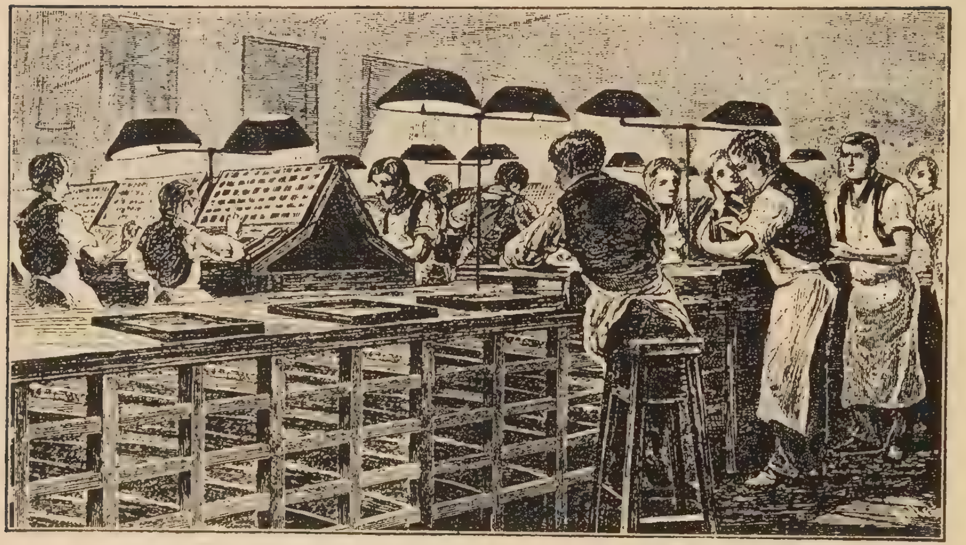
The first is the Typary machine, which, though not strictly a photo-composing machine, was directly inspired by the desire to abolish type-setting, and the copy produced is used for photo-reproduction by the Typon process, described elsewhere. The striking of the keys brings forward certain bars bearing type characters, which are inked and impressed on paper, letter by letter, in automatically justified lines.

The machine is actually in practical use, and a number of books have been satisfactorily produced by its means.

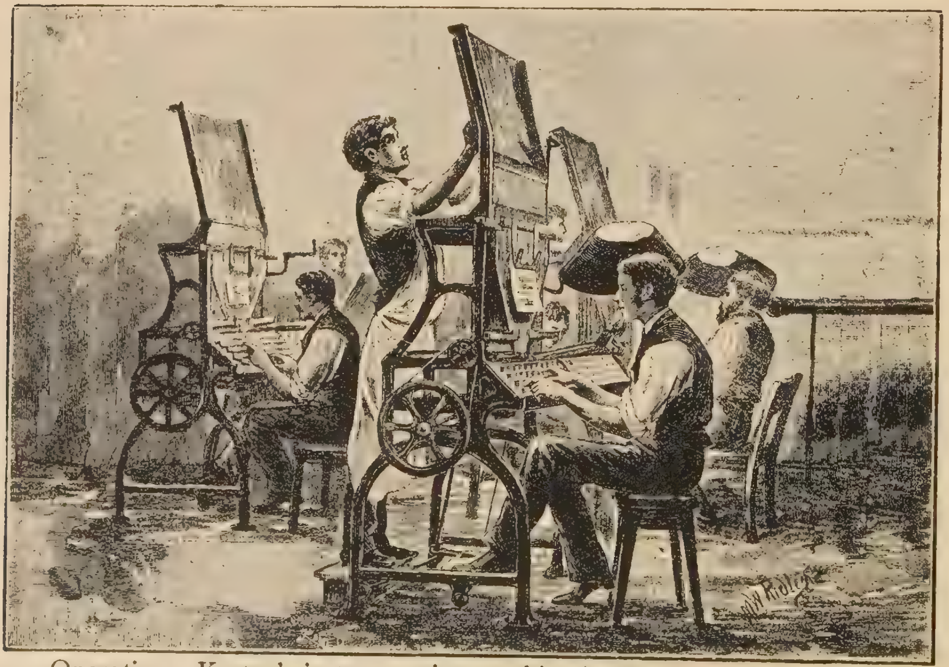
The second machine is the Discotype, which has been completed and tried, with good results. In this machine the letters are arranged round the margin of a glass disk, which is revolved to bring the desired character before the lens, while the touch of a switch makes the exposure. Spacing and justification have to be taken care of by counting up when adjusting the apparatus. Naturally such a method is relatively slow, and the machine will only be suitable for display work.

The third machine is that known as the August-Hunter, and it is on this that the greatest interest is centred, because it appears to embody the features of speed and flexibility which practical requirements demand. The machine has now been in course of construction for about seven years, and this long delay has led to some scepticism being expressed as to whether it will ever be completed. The chief reason for the delay, it is understood, has been one of finance, and that is the question most likely to determine whether this problem of photo-composing will be solved by any machine.

The writer has recently seen the August-Hunter machine in an advanced state, and sufficient photographic work has been done with it to demonstrate that the principles are correct. Briefly described, the machine perforates a band of paper through the operation of the keyboard, the paper band then setting in motion by electrical contacts various parts of the apparatus, which automatically operate the positioning of the letters before the lens, the adjustment for size, the choice of style or face, the switching on of the light source, the opening and closing of the shutter to make the exposure, the stepping to the space for the next letter, the justifying of the line, and the spacing between the lines. It is difficult to describe the wonderful electrical and mechanical details of this remarkable invention, but it is sufficient to say that, however complicated it may appear, the working is actually simple and almost automatic, all the movements, except the striking of the keys and adjustments of certain levers for style and size, being electrically operated. In spite of the enormous number of changes involved the wires which convey the electrical impulses have been reduced to thirty. The possibilities of the machine may be imagined by the fact that it will provide thirty faces, ninety characters, and ninety-one sizes, which is equivalent to 245,700 separate founders' types, and it has been calculated that it would cost £400,000 to provide the same range in type founts. The output of the machine will be determined by the



The composing room of *The Times*, *circa* 1880.



Operating a Kastenbein type-setting machine in *The Times* Office (1882).

expertness of the keyboard operator, but it may be assumed at typewriter speed. The possibility may be visualized of having a keyboard in London which will operate a photographic apparatus located in Manchester, Glasgow, or even New York, transmitting by ordinary telegraphy or wireless, and any number of photographic units could be worked from one keyboard.

W. G.

CHAPTER V

PRINTING METALS

COMPOSITION OF THE ALLOY

The widespread use of machinery has introduced into almost every printing house some mechanical method for casting and setting up type. This growth in mechanical composition has brought into use increasing quantities of metal for casting type, stereoplates, &c.

While there is little scope for making basic improvements in these metals, because no suitable substitute has been found and it is not possible to alter their physical properties, the standards of their quality and composition have been steadily raised. Modern methods of smelting and refining reduce the impurities that are detrimental to the working of the metal; they help to produce metals exact to the desired composition, and materially reduce the production costs of the metals. Over the last few years, due to increasingly long runs, particularly in newspaper production, and to the constant desire to improve the quality of printing, there has been a tendency to increase the amount of tin and antimony in metals, and so improve the sharpness of the type face and its resistance to wear. The increasing cooperation between producer and user helps in the appreciation of the correct method of using metal and in the provision of compositions most suited to individual requirements.

There are two essential properties required of a metal to make it suitable for printing purposes. It must be reasonably fluid at a temperature that will not burn the mould or matrix. It must expand slightly at the moment of solidification, in order to obtain a sharp impression of the mould. This property of expansion is found in antimony; but by itself antimony would be quite unsuitable, being very hard but brittle and melting at a high temperature. By mixing it with tin and lead in certain proportions an alloy of the required properties is obtained. The proportions of tin, lead, and antimony are usually between the following limits:—

Tin	2 per cent. to 20 per cent.
Antimony	10 per cent. to 30 per cent.
Lead	50 per cent. to 88 per cent.

Printing metals are not simple mechanical mixtures of the three elementary metals, tin, lead, and antimony, for in the solid state they have a highly complex structure, and although each elementary metal present does impart to the alloy some of its own physical properties, the printing metals are definitely new bodies with their own individual characteristics. Speaking broadly, the lead may be regarded as forming the body of the alloy. The tin confers fluidity and toughness. The antimony confers hardness and the property of expansion already described and so necessary to obtain sharp-faced type.

In a short article of this nature it is not possible to do more than touch on the highly complex stages through which a printing metal passes during the melting-up and casting. In a fully molten and mixed state a printing metal may be regarded as a uniform mixture of tin, lead, and antimony. If the temperature of this mixture is allowed to fall steadily, the mixture undergoes certain changes in constitution before it finally solidifies. Below a certain temperature—called the "separation temperature"—the elementary metals present in the mixture begin to form various metallic combinations with one another, which separate out in a solid state from the mixture. As the temperature falls still farther, increasing quantities of the constituents separate out in the solid state until at last a temperature is reached at which all the remaining fluid portion solidifies. This temperature is called the "eutectic temperature," and, like the "separation temperature," it varies according to the composition of the alloy. The name "eutectic" is given to that mixture of the elementary metals which has the lowest melting point.

From the above account it will be seen that there are three distinct stages during the slow cooling of a printing metal.

First stage.—The alloy is fully molten and of uniform composition as long as the temperature is above the "separation temperature."

Second stage.—The alloy is partly solid and partly fluid when the temperature is below the "separation temperature" but above the "eutectic temperature." At this stage it is no longer uniform in composition, for the solid portion is of different composition from the fluid portion.

Third stage.—The alloy is entirely solid when the temperature is below the "eutectic temperature" and its physical structure is complex.

In order to obtain satisfactory casting, it will be seen that the temperature of the metal when being cast must be such that the metal is in the first stage described. That is to say, its temperature must be above the "separation temperature." The actual temperature is further governed by a number of secondary factors, such as mode and speed of casting, rate of cooling, size of type or stereoplate, surrounding conditions, &c.

This description of the changes that take place in an alloy begins with the fully molten metal. If the procedure be reversed, that is to say, the metal is solid as in the third stage, the changes occur in the reverse order and the metal is not in a suitable form for casting until the temperature is above the "separation temperature" for the alloy.

It must be realized, therefore, that temperature is of vital importance, and that the working temperature is principally governed by the "separation temperature," which in turn varies according to the composition of the metal.

The composition of any printing metal is dependent partly on the method of casting and partly on the required degree of hardness of the type face. Also to some extent the composition is dependent on a balance being maintained between the amount of tin present in relation to the amount of antimony. In general, compositions come between the following limits:—

MONOTYPE METAL

Tin ..	5 per cent. to 12 per cent.
Antimony ..	14 per cent. to 25 per cent.
Lead ..	81 per cent. to 63 per cent.

STEREOTYPE METAL

Tin ..	3 per cent. to 10 per cent.
Antimony ..	14 per cent. to 17 per cent.
Lead ..	83 per cent. to 73 per cent.

SLUG-CASTING METAL

Tin ..	2 per cent. to 4 per cent.
Antimony ..	10 per cent. to 13 per cent.
Lead ..	88 per cent. to 83 per cent.

From which it will be observed that in common practice monotype metals are comparatively rich in tin and antimony, and therefore follow in some degree the composition of founders' type. Stereotype metals are wide in range of compositions, since it is possible to cast stereoplates from any printing metal excepting with certain high-speed automatic casting machines, which cannot easily adapt conditions to suit such a wide range. In the case of slug-casting machines the slugs are rarely used for direct printing, the usual process being to make a stereoplate of any matter set in slugs. Thus a soft metal comparatively low in tin and antimony, and therefore cheap, can be used.

From the foregoing it follows, first, that it is very important to use the correct composition for the particular purpose in view; and, secondly, to use it at the correct temperature. A better appreciation of these two points by printers would prevent many of their difficulties from arising.

Printing metals are also used for certain other purposes besides mechanical compositions and stereoplates. Copper electros are "backed" with a soft alloy containing a small percentage of tin and antimony. Leads and rules are cast either in ordinary printing metal or else from an alloy of lead and antimony. Quads and other spacing material are generally cast in an alloy of lead and antimony, since a hard printing face is not required.

CHAPTER VI

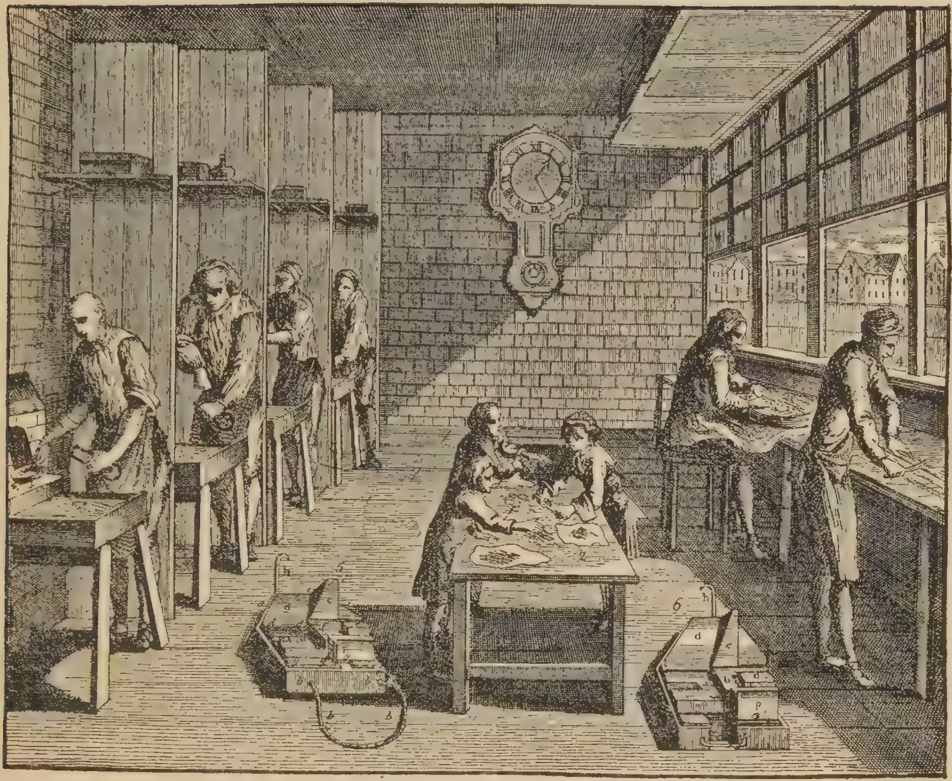
TYPEFOUNDING

THE CLASSIC METHOD

The minute points of detail which make one type different from another escape the notice of most readers of newspapers, magazines and books; and they are not always distinguishable by the expert—the number of varieties of even one style of type may run into hundreds. It is impossible to explain in a note the nature of these differences; but a short explanation of the technical principle of typefounding may be given.

It is nearly five centuries ago that for the first time type was actually cast for the printing of books in Europe, be it in the Netherlands or in Germany. It cannot be said too often that the so-called invention of printing ought to be called the invention of typefounding. We are completely in the dark as to the methods of founding in those times, although many cleverly wrought hypotheses are known; they are, after all, mere hypotheses, and such they will most likely remain for ever. There is, however, one point which can be said to be certain. Before 1500 the principle of typefounding was the same as that of to-day—*i.e.*, there were the same three steps in typefounding—punch-cutting in steel, matrix-making in copper, and finally the casting of the type itself in a material in which lead is the basic metal. As to the design of the letter, it may be said that the early punch-cutters did not have their designs made by somebody else, while nowadays there may hardly be found a single craftsman who is a capable punch-cutter and his own designer at the same time.

The original, or rather the classic, method, which is still undoubtedly the best, is to cut punches by hand—a method which allows of the making of the most minute corrections. At the same time, the punches should be cut in close contact with the designer of the letter; almost daily meetings are necessary in order to secure the result desired by the type-designer. Even when the designer makes his drawings, as he is obliged to do, on a larger scale than the size of type to be cut, punch-



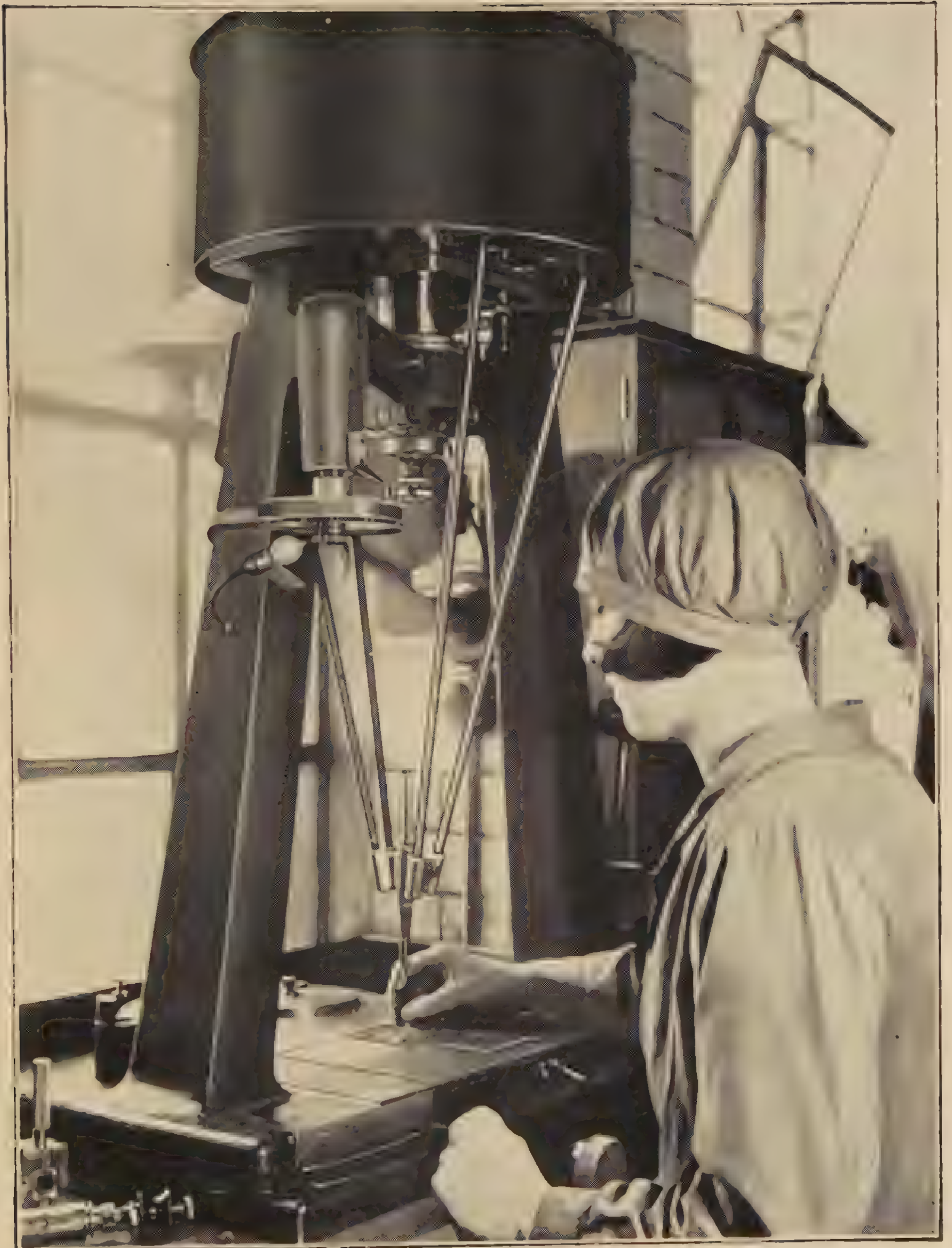
Interior of the Caslon Letter Foundry, 1750, from an engraving made for the *Universal Magazine.*

cutting itself will always be a matter of strictly individual craftsmanship, and it is intimate cooperation, together with fine craftsmanship, which finally produces the really good printing type.

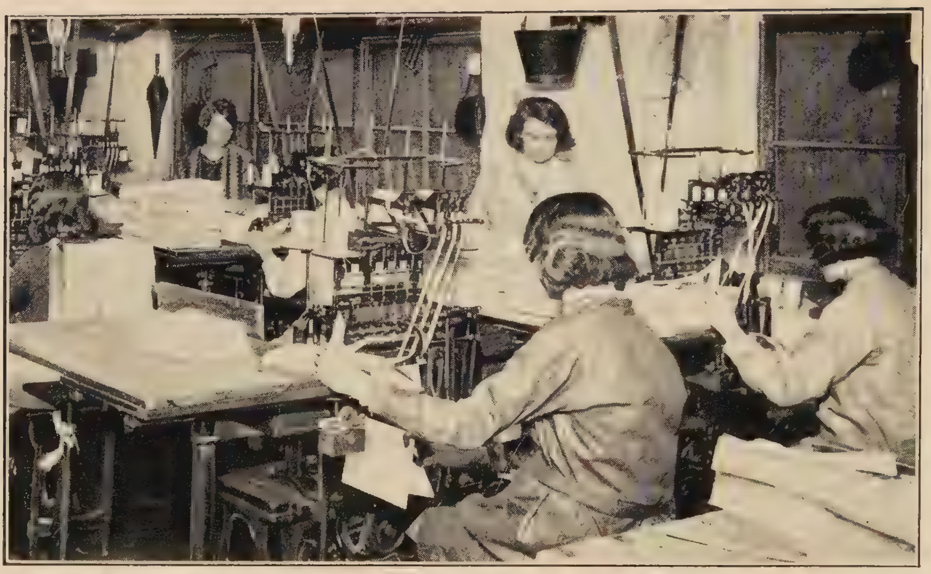
In the last twenty or thirty years various methods have been invented to cut punches mechanically; but the smaller or greater degree of distortion inseparable from the mechanical reduction of the design has, up till now, made it impossible to put a machine-made punch on the same level as that cut by hand. This does not mean that the cutting of punches by machine is objectionable, but it ought to be kept strictly in its own place. To-day, punch-cutting by machine can be effected with marvellous precision if only the right model is at hand; so where a fair quantity of punches has to be cut a skilled punch-cutter ought to be on the spot continually to make those tiny, yet most important, corrections required by the trained eye of the directing expert.

Under strict supervision of this kind it should be possible to produce, with the aid of punch-cutting machines, a fount which should stand comparison with the finest achievements of the past. It would not appear that this point is nowadays adequately recognized. It is thought that a drawing or a photograph sharpened with Chinese white, enlarged pantographically, and corrected in its details by mechanical curves, reduced and transferred to a pattern arranged for the punch-cutting machine, will by itself be sufficient to produce a type of meritorious design. These are not the only methods employed by modern typefounders, but neither they nor any other method employed in complete substitution for the arduous work of hand punch-cutting have produced a design of any permanent value—*i.e.*, for the printing of books. It remains a fact, therefore, that at present new typefounding methods are more adapted for the reproduction of existing types than for the creation of new ones, so that, without exception, the types used in the vast bulk of newspapers and books are immediately derived from founts evolved by hand punch-cutters.

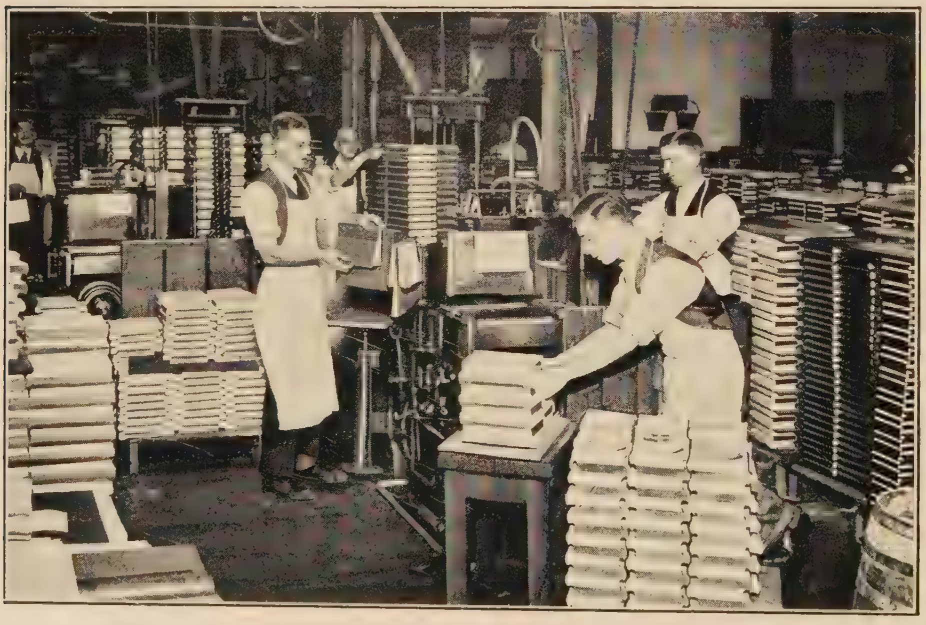
The completed punch bears on its top the reversed design of a single character as it appears in print. It is driven into a slab of copper, which becomes the matrix—*i.e.*, the mould in which finally is cast the type from which the printing is done. J. VAN K.



A modern matrix-cutting machine.—The operator is seen tracing the pattern by means of a pointer which, on the pantograph principle, cuts the matrix held in the upper part of the instrument.



Operators at the Leighton Straker Bookbinding Company's works placing the gathered books, section by section, on the arm of the machine which sews them into a continuous block. This block is then cut up into separate books.



This picture shows the forwarded book being put into its case by machine, the adhesive being paste. The books are then piled up between boards, put under pressure and clamped into containers until completely dry.

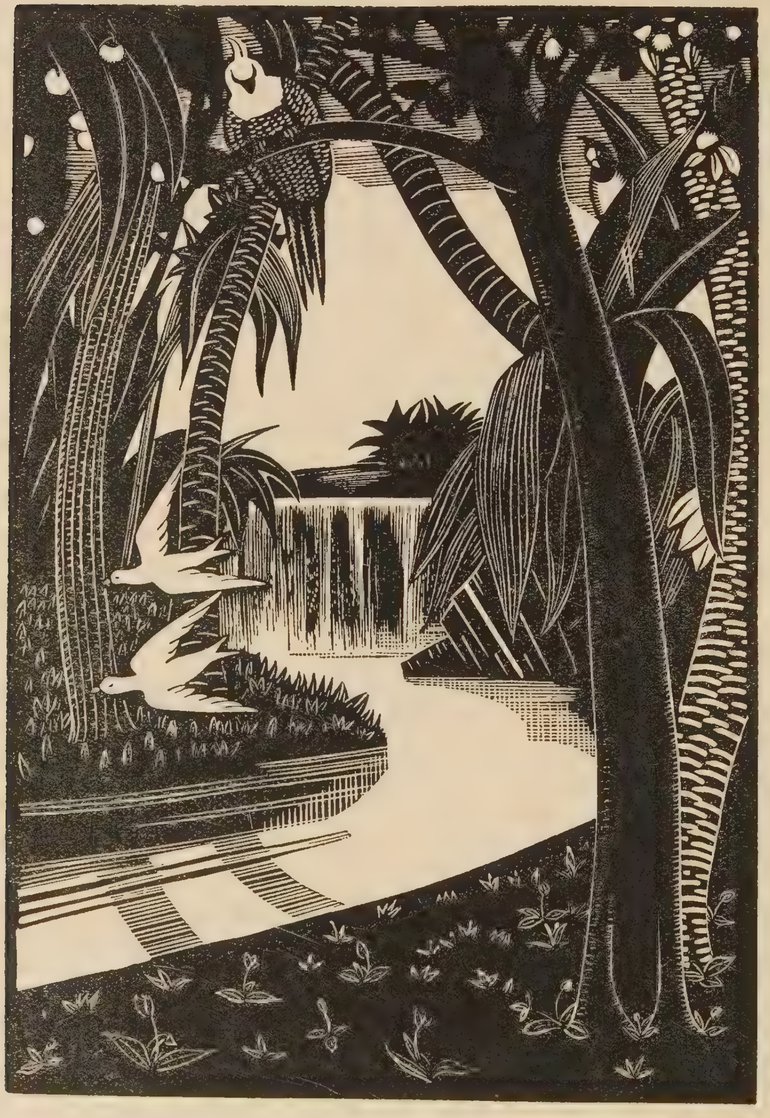
PART III
BOOK MAKING

CHAPTER I
PRINTING FINE EDITIONS
SOME GOVERNING PRINCIPLES

The essential characteristics of a fine book on the material side, apart from its literary content, depend upon three things: First, the paper; secondly, the type and its arrangement; and, thirdly, its illustrations, if such are required to supplement the text.

Paper has always been made of vegetable fibre, and, until the introduction of machines, a sheet at a time by hand. For books in which the cost is not of first importance hand-made paper is often used, which, when made of linen or cotton rags bleached by wear and washing and not by chemicals, has a character of its own. But good paper suitable for fine printing and made by machinery is to be had. Such paper without the lines impressed upon it in imitation of the "laid" lines of hand-made paper and sham "deckle" (rough edges) can be made from good materials. England has long had a pre-eminence in the best hand-made papers. They are expensive, and it is to be feared that cheaper and inferior papers from Holland, France, and Italy are sometimes displacing them. So, too, are certain makes of machine-made paper known as "mould-made," though they have been produced upon cylinder machines and not made by moulds, as are hand-made papers. The thickness of the paper should vary with the size of the page; thick paper is very objectionable in small books, and it can hardly be too thin, providing that at the same time it is opaque.

The first consideration in the lay-out of a book intended to be fine is to adapt the size of the type to the size of the page. A large book should have a type big enough to be read without inconvenience. Small types were used chiefly for the production of books where economy was an



"Love is birds among fruit and running water."

Illustration to "Red Wise," by E. Powys Mathers, from the wood-engraving by Robert Gibbings.

object, less paper being required—an important matter when all paper was made by hand and expensive. It is often the custom to insert what are called "leads" between the lines of type; this is an advantage when the book is in a small letter. But a better way is to set the "copy" in a larger size of type without leads, or very thin ones. By so doing, as much of the text can be printed on the page, and in a more legible way (in printing size makes for legibility), as in the "leaded" small type. It is not more costly to set, and no more paper is used.

Until the introduction of composing machines some years ago the choice of types of good design was rather limited. At first, as the machines were used chiefly for newspaper printing, where the design of the type is not considered of much importance so long as it is readable and is not too wide—*i.e.*, taking up more space—the "faces" available were, to say the least, generally indifferent from the point of view of beauty. But of late years the companies who control these composing machines have devoted very great attention to the production of types of distinguished design. Some of these types are copied or adapted from the best Italian and French faces of the sixteenth century. They are, however, available only to the purchasers of the machines, which is a handicap to the smaller printer. The best printing offices nowadays give considerable attention to the even spacing of the words, a matter much neglected formerly.

The next point to be considered is what is called "imposition"—that is, the placing of the pages in their proper relative position to each other and to the paper page of the book. Some of the earliest specimens of manuscript book-making illustrate the principle admirably—that is, the two pages should be considered as one unit of design and the margins arranged around both pages accordingly. The narrowest margins should be in what binders call "the gutter" of the book, the next wider at the top of the page (and for this purpose the measurement should generally be made, if the headline is short, from the top of the text and not from the top of the headline), the outer margins wider still, and the lower margin, or "tail," the widest of all.

It is not unusual, though less frequently now than formerly, to print some copies of a book upon a larger paper than the ordinary copies. These are called "large paper" copies. When care has been taken to adapt the size of the type to the size of the page and the paper it seems absurd to print the book upon a larger size. A book may be spoiled quite as readily by printing it upon a paper too large for the type page as with margins too small. This custom of making "large paper" copies may have originated in consequence of a former habit of binders to cut the margins off when rebinding a book. If the book were a popular one it may have been rebound more than once, and a copy uncut would be comparatively rarely met with. The margins which suit the original book are quite wrong for a larger one. Sometimes the pages are reimposed and the excess of margin distributed, then the page of type looks too small for the paper.

Another point in connexion with the production of books intended to be fine may be considered. Books, especially those issued by French publishers, are sometimes advertised as being printed upon various papers—Whatman, Japanese, Dutch, &c. When an expensive book is sold, perhaps for many pounds, surely the whole edition should be printed upon the paper best suited for it regardless of cost. An extra pound or so would probably cover the difference in cost between the most expensive and the least expensive paper which could be used. The so-called Japanese "vellum" paper, which is said to be made upon European machines from the fibre of the paper mulberry, has a beautifully clear ivory-like colour, and gives a brilliant impression of the type ; but the paper, should the book be much handled, gets a flannel-like texture which is most objectionable. It would surely be worth while to sacrifice a little of the brilliance for the sake of using a fine English hand-made paper which will always retain its first state. Books printed upon vellum are sometimes, but not always, quite as satisfactory in appearance as those printed upon a really good paper ; but collectors have generally prized such copies on account of their rarity, and will probably continue to do so.

Most fine books have illustrations, and these are important, and should be reproduced and printed by the method best suited to the dignity of the book, such as engraved copperplates, etchings, photogravures, collotypes in monochrome or in colour, all of which have to be printed apart from the text, or in some cases from drawings in line which can be printed in the pages of the type or upon the paper of the book. This would exclude the use of half-tone blocks, which demand a coated paper with a polished surface. But if half-tone blocks for three or four colour printing must be used, the best way is to cut the impressions close to the printed surface and mount them upon the book's "own" paper; this avoids the objectionable glossy margin and gives a unity not otherwise obtainable. Sometimes such pictures are merely attached by one edge to the mounting paper, and are then very liable to damage in closing the book.

Facilities for illustrating books have increased enormously during the past 100 years, and still more rapidly during the last forty years. In the eighteenth century prints from engraved copperplates were practically the only means of multiplying illustrations. The use of wood-engraving, popularized, if not invented, by Bewick at the end of the century, introduced a simpler and cheaper method, and this, in turn with lithography, superseded the older process. They were displaced to a great extent by various photographic processes. The most popular and cheapest of these, the half-tone process, has created a complete revolution in book and newspaper illustration. The greatest drawback to the process is the necessity for the use of the heavy coated paper for anything but comparatively rough newspaper printing. The only methods suitable for a fine book besides engraved copperplates or lithography are collotype and photogravure, or line drawings to be printed typographically. All these five methods can be printed upon paper free from the objectionable coating.

Finally, a word should be said as to the insertion in a book of pages of thin paper bearing the title of the illustration preceding the plate. The ink used in printing copperplates does not dry very quickly, so when the prints were placed in a book it was customary to put a piece of tissue paper over the impression to avoid "set-off" when the book was pressed by the binder. Presently, instead of a tissue paper, removable when the ink was dry, a sheet of thin paper was bound in, and this was utilized for printing the title of the picture. In the writer's opinion the natural place to put the title of the subject of an illustration is beneath the picture, and not on a page which has to be turned before it can be read. As all copperplates are steel-faced before they are printed, there is little essential value to be attached to unlettered impressions, especially those printed for the edition of the book.

It is interesting to remember that the modern revival of fine printing originated in England. Before William Morris produced the highly individual work of the Kelmscott Press the average printing of books had sunk to a somewhat low level, especially so far as the design of type was concerned—the press-work was often good—though in the eighteenth century Foulis, of Glasgow, not to mention some of the early practitioners, and William Pickering had done much to redeem it. Mr. St. John Hornby, of the Ashendene Press, Mr. Robert Gibbings, of the Golden Cockerel Press, Mr. Maynard, of the Gregynog Press, Mr. Bernard Newdigate, of the Shakespeare Head Press, Mr. Francis Meynell, and the University Presses of Oxford and Cambridge have all done admirable work. The inspiration has proceeded from William Morris, although in some cases there is very little superficial resemblance. Morris showed how a printed book might be on its own plane a work of art.

E. W.

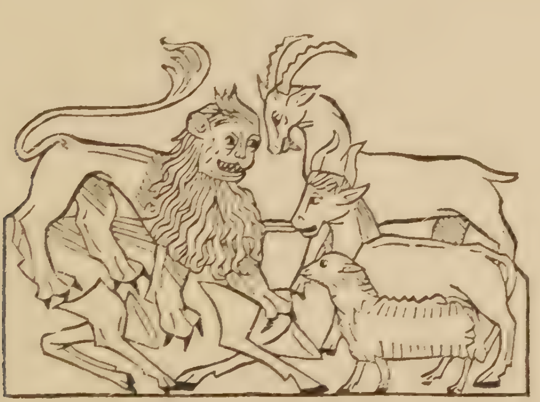
ORNAMENTATION OF BOOKS

The element which makes for the success of book ornament is a perfect harmony between the mechanically printed page of type and the artist's inventions intended to decorate it. Too often illustrations which might be quite suitable for elucidating the text have not the least value in ornamenting the page. The page of type is a greyish diaper, and anything to be printed and to be in keeping with it must harmonize or present an agreeable contrast. Ususally this harmony is best obtained by making the drawings in line; the really important matter is that the designer should work with the printer and, if he knows enough about the practical side of printing, control him. For want of this cooperation the Pre-Raphaelite illustrators—Millais, Frederick Walker, A. B. Houghton, Sandys, and others—failed in making books which were ornamental in the proper sense. Moxon's "Tennyson" of 1857 is full of admirable designs, but these have no relation to the type. The engravers who attempted to make "facsimiles" of the drawings had a task beyond their powers in most cases, and even where they had been successful in pleasing the artist the wood-engravings were entirely out of keeping with the type.

It is interesting to remember that Rossetti's drawing for the frontispiece for his sister Christina's "Goblin Market," published five years later, was cut by an amateur, Charles Faulkner, an Oxford don, who had come under the influence of William Morris, and shows a greater typographical instinct, although it was unsupported again by the printer. In any case the artist must make his drawings in a manner capable of reproduction either by process blocks or wood-engravings designed so as to come into mechanical relation to the type. Those artists who deliberately set themselves to make designs which would decorate a book have worked in this way consciously or unconsciously.

The drawings need not be what is generally called "ornamental"—*i.e.*, related to a particular period or school of design; but it is essential that they should be capable of being printed in or with the type; in other words, the drawings for the blocks should be such as could be engraved or reproduced to make what amounts to rather more complicated pieces of type. Much ornament done on these principles has been designed of late years by Mr. Bruce Rogers and others, who have set themselves to revive what was called in the eighteenth century typefounders' specimen book "flowers." These are composed of simple elements cast as type and set up by the printer according to his taste. But any drawings made strictly in keeping with the type tend to make the pages decorative.

In the early days of typography, when weak screw presses were the only methods available for printing, the engravers of the illustrations were compelled to adapt the designs to what the presses could do, and the woodcuts produced were well suited for such printing. The books of the fifteenth and early sixteenth centuries from the presses of Germany, Italy, and France were perforce ornamental. With modern machines which will print perfectly any kind of block which can be set with the type, it is necessary for the designing artist continually to bear in mind the type which must accompany his drawings. If he does this the pages will be agreeable to look at in most cases, and if he is quite successful his book may be a work of art. E. W.



Woodcut (reduced) from "Aesopus, Vita et Fabulae,"
Strasburg, Heinrich Knoblochtzer (*circa* 1490).

CHAPTER II

BOOKBINDING

LETTERING AND DECORATION

Fine or "extra" binding is still done by hand by methods and appliances that have changed but little during 400 years. At its best fine bookbinding ranks as a minor art and calls for a high degree of taste, skill and knowledge, combined with some power of invention. A lavishly decorated hand-tooled binding takes a long time to do, and, therefore, must be costly, but there are binders in this country who produce work of this excellence that is well worth its price in time and money. An important branch of skilled binding deals with the repair and protection of books of value, and calls for patient dexterity and a real love for old books, for there are very many ways in which a binder can reduce the value of the volumes he deals with. On the other hand careful and understanding work may transform a perishing fragment into a usable document of great value. On the Continent of Europe most books that are bound are bound by hand in the comparatively small workshops that are to be found in every town of any size. In English-speaking countries nearly all books are issued "bound," and only a small proportion receives any other covering than that provided by the publisher. As a result hand-binding is a much smaller trade with us than it is on the Continent and is mainly centred in London and other large cities.

Publishers' and printers' binding is a machine trade that calls for little individual skill on the part of the workman. In order to cope with the immense and rapid output of books that modern printing machinery has made possible, machines have been invented for doing all binding processes. It has not been found possible to reduce the process of binding books to the simplicity of printing, for whereas the main recurring expense in printing is that concerned with the actual machining and the cost of paper and ink, nearly all the other costs being divisible by the number of copies printed in order to arrive at the unit cost, in binding, even in the most up-to-date printers' bindery, there is no such gain in unit cost resulting from long runs of identical bindings. Machinery has been developed on the lines of one machine for each process, and cutting the sheets, folding, gathering, end-papering, sewing, cutting the edges, gluing up the back, lining the back, case-making and blocking (done apart from the book), casing-in and pressing each requires a separate machine, and between each machine the books must be moved by hand. Sometimes edges are gilt or coloured, and these are still hand processes, as is the laying on of the gold for blocking, although there is a recently introduced machine that will feed specially prepared gold and metal leaf to the blocking press.

It is of course right that a machine-printed book should be bound by machinery if large numbers of identical bindings are wanted, and if the machines can do the work reasonably well. Binding machinery dealing with large numbers does the work better than it could be done by hand. Hand work may bind a dozen or a hundred volumes better than machinery, but for very long runs the work if done by hand becomes almost wholly mechanical, and men and women, on soul-deadening repetition work, lack the tireless accuracy of the machine. The machines as designed are efficient and work with such apparent intelligence that I have heard it suggested that they ought to have votes, but they are not always allowed to do the best work that they are capable of doing. The sewing machines will sew books on tapes, but most books are now issued sewn without tapes and therefore with no very satisfactory way of attaching the book to its case.

For edition binding it is necessary to make the cases apart from the books, as this enables the work to be done by a machine and allows the cases to be blocked on the spine, but case binding does involve some weakening of the connexion between the book and its cover as compared with true binding, in which the boards are laced on by the slips before covering. However, by sewing on tapes and pasting or gluing the slips formed by the ends of the tapes on to the boards under the end-papers a reasonably satisfactory attachment can be made, especially if a good quality end-paper, strengthened at the joint by a layer of muslin, is used. Greater strength can be got by adding a "liner" of thin board over the slips, thus holding them between two boards. This in one form or another is the system adopted by the library binders, who, however, generally attach their "split" boards before covering. While some publishers are trying to discover how firmly cases can be attached to books under commercial conditions, others seem to be trying to discover what is the minimum attachment that the book-buying public will put up with.

The axiom of the weakest link applies to books and their binding as well as to chains, and, given reasonably good paper and sound sewing, the joint is the weakest link in most cased binding. If the paper is worthless and cannot be held by the sewing thread, an ever weaker link is introduced, and then it does not much matter how little strength there may be in the attachment of the case, for the leaves themselves will fall out if the book is read more than once or twice. The featherweight or bulking paper now so largely used has this fault. This paper is used solely to bulk out thin books, and it is odd that when in private houses and great libraries alike there is constant complaint about the difficulty of finding shelf-room for books, the book trade should declare that the public will not buy books unless they are of a certain thickness for a given price. The trade may be, and probably is, right. At any rate, paper puffed up like an omelet to make it bulk is used for quite a large proportion of books, and this paper for practical purposes is unbindable. It has wofully little strength, and what it has is halved by folding, so that the sewing thread cuts through it, and as the sewing thread sinks into its thickness no "swelling" is produced and therefore no sound and permanent shape can be given to the back and, moreover, the glue cannot hold the sections together, as the surface of the paper flakes off with the glue. The library binders, in order to make featherweight paper books moderately serviceable for public library use, are forced to guard with thin paper the fold of every pair of leaves; a troublesome business that should be unnecessary and that is only partially effective because, however strong the folds may be made, the leaves will tear elsewhere. Thoughtless people praise these featherweight books for their lightness, but a good paper of equal area and weight for the area can be had for the same price. This would make thinner but far more serviceable books of the same weight.

Cases are blocked with lettering on the spine and sometimes on the sides, and sometimes are decorated by designs in gold or colours. While a sound living tradition has been established for good printing this has so far failed to affect the bulk of the lettering and decoration on cloth cases, although blocking is essentially a printing process. Some successfully decorated cases have been made and here and there well-designed lettering is well placed, but for the most part the lettering and decoration of binders' cases fail to reach the level generally attained in the printing of the pages they protect. Of recent years the development of the dust cover has led to less and less attention being given to the appearance of the ordinary publishers' covers, as the publishers seem to rely upon the paper wrapper to make the books attractive in appearance, and the book-buying public is inarticulate and accepts what is offered.

There is, however, a class of book that is more and more being designed as a whole, with paper, printing, and binding conceived in proper relation to one another with the single aim of making a fine unit of production as a bound book. These are the productions of the so-called "private presses," where carefully designed books are produced, generally in small editions. The difficulty of arriving at a cover in keeping with a well-printed book that can be produced at a possible cost is real enough, but where equal care is given to the binding as to the printing the difficulty can be overcome. Many of these carefully designed books are issued in cases made with a strip of binding material down the spine and with printed or marbled paper sides. If the binding cloth used has adequate strength in its basic weaving and the paper sides are of a good quality and the case is firmly attached to the book, very charming and satisfactory covers can be made on these lines. Sometimes vellum is used for the back and sometimes leather with cloth for the sides, and if colour and material are well chosen and the lettering is well designed and well placed good results can be obtained.

The theory that publishers' covers are temporary dies hard; but, permanent or temporary in intention, they are all the binding the great majority of books ever receive, and if the aim is to bring out a book that is satisfactory in all respects it must have a durable cover, unless it is issued half finished in an obviously temporary binding or wrapper. Good cloth wears far better than bad leather and good paper than poor cloth. It is far better to use the best quality of a humble material than the worst of a material of higher pretensions, and where good material is well used and the construction of the binding is sound, each "link" will hold and there will be no obviously weak spot.

Compared with the total output of books those produced by the "private presses" are few in number; but just as much of the improvement in general book printing is directly traceable to the work of the "private press," so the care now being given to binding these carefully printed books pleasantly and strongly may, by setting a higher standard, have an equally good influence on the general run of publishers' binding.

D. C.

CHAPTER III

LOW-COST BOOKS

THE PUBLISHERS' POSITION

Not cheap books—but low-cost books. It is worth while to risk the charge of being pedantic in order to emphasize the fact that we do not subscribe in this instance to the dictionary's suggestion that good books purchased at however low a cost can be "of small value; common; not respected." In the world of books more than anywhere else it is true that the price paid has no relation to the value given in exchange—at least not if one has an eye for ultimate values. And if in the course of the following paragraphs we lapse into the commoner form of speech and speak of "cheap" books it will not be taken to involve an acceptance of the baser use of the word. We have made our protest in the title.

It is impossible even to begin to write on this subject without asserting emphatically that in this country to-day books are priced very low. Such exceptions to this statement as may suggest themselves only serve to throw the general rule into stronger relief. Of all commodities that have survived the assault of post-War costs, books take pride of place with the chairs in Hyde Park. From time to time there bursts out a volume of uninformed chatter to the effect that the sales of books are hampered because the publisher and bookseller are in league to keep up the price of books. It is difficult for responsible people to meet this charge every time and everywhere it is made, but it has been answered again and again.

Apart from the correspondence that has taken place in responsible journals on the subject of book prices, the full facts about the cost of producing and distributing books have been written down for all to see in Mr. Stanley Unwin's book entitled "The Truth About Publishing." The costs for both publisher and bookseller are far higher than some sections of the public wish to believe, and the margin of net profit is very low indeed. Only large turnovers can keep both sections of the trade going; and this fact is emphasized by the number of small publishers who, during the last few years, have gone under or been "merged," and by the small number of booksellers, properly so called, to be found in any but the largest provincial towns.

Before we say that a book is priced too high we should be in possession of information that only the publisher can give, for it is not simply a question of the number of words or pages in a book, but pre-eminently a question of the number of copies that are likely to be sold. That is the essence of the whole matter. One handles every little while a book priced at, say, two guineas, written on some erudite or highly technical subject. It is almost unintelligible to the ordinary individual, reading for all the world like a foreign language. You read an odd paragraph and marvel that a man should be able to write even these few lines without days of research. The book as a whole probably represents a lifetime of study. You try to reckon the number of copies that can possibly be sold of such a book, and recognize that even at two guineas, or whatever it may be, it is a low-cost book. The probability is that a publisher is issuing it solely for the pride of being able to include the book in his list. The number of books published every year which bring no profit or only a nominal profit to the publisher must be very considerable. At best the number of works of non-fiction that run into big figures is very low.

And with fiction the "big sellers" are the novels of established authors for whose manuscripts a high figure has been paid. It may interest those who plead for new fiction at a lower price than 7s. 6d. to know that one reason why experiments in this direction have not increased is that the enterprise has not been supported by the big circulating libraries. And why not? Because library subscribers will not include 3s. 6d. novels in their order lists; they evidently argue that having paid their subscription they are not to be satisfied with anything cheaper than 7s. 6d. books. And the circulating libraries are the main support of the average novel.

Of course there are some books published at a price that it would be very hard to justify—those volumes, for example, that record the amorous adventures of unknown English and foreign gallants of bygone centuries. Who buys them? No bookseller knows. These books are the mystery of the trade. The usual theory is that they are produced for library consumption, and that no individual purchaser is expected to buy them. And there are those ponderous two-volume biographies whose death-knell has surely been sounded, for the public have been saying quite clearly of late that they will not have them. In this latter case, if we knew all we might modify our criticism, for the modern method of hawking a big manuscript round the London publishers and pitting one publisher's offer against another has led to enormous prices being paid for some books; and the publisher having paid the price must often be hard put to it to discover methods of getting back his money.

But this competition among publishers is an insurance against high-priced books. Let one publisher put out a new idea and make a success of it and he will quickly be followed by his fellows, ready, if they can, to cut his price and capture his market. Witness, for example, the number of "omnibus" volumes that have been put on the market during the last year or two, and the number of series we have had of 3s. 6d. uniform pocket editions. Each of these new movements was the result of the outstanding success of a pioneer, but each of them is definitely in the direction of a lower-cost, higher-value book. The price of books will always be kept low because the public do not reckon them as necessaries of life, but quite definitely as luxuries; by some strange logic they are reckoned far more luxurious than a cigar or a dinner or a theatre box, for thousands of people who will embark on these expenses without a thought hesitate long over the purchase of a book—hesitate so long, indeed, that many of them never buy one. The publisher realizes that he is trying to catch shy fish; he knows how his sales drop according to every sixpence he adds to the price, and the price he fixes is the lowest possible. The average person outside the trade can have little idea how much smaller, for example, is the public that is reached by a book if the price is increased from 2s. 6d. to 3s. 6d. That 1s. makes an enormous difference. It has not to be overlooked that the existence of the circulating libraries has to some extent had the effect of keeping down the price of books. Publishers welcome the orders that come from circulating libraries in so far as they represent books that would not otherwise be sold at all, but obviously in their own interest they will never embark on a policy that would change existing buyers of books into borrowers of books.

There is to-day an increasing recognition of the possibility of a popular market for books such as we had not dreamed of a few years ago; and there need be no hesitation about admitting that this new vision has come very largely because of the experience of bookselling in the cheap stores scattered up and down the country. It is true that the quality of the books sold in these places is not of the highest order, although it has to be borne in mind that many of the books that have been sold have been works of fiction that take their place among the English classics. Booksellers who feel jealous of this book business done "outside the profession" can rest assured that in a very large number of cases it will awaken an interest in books that can be satisfied only from the stock that a real bookseller carries.

In this way millions of volumes have been sold, and all who are interested in the welfare of books are anxious to read aright this sign of the times and to know the real significance of the development. It may be that one of its results will be to make booksellers experiment with a different type of bookshop. It is true that no genuine book-buyer would want his bookshop to be other than it is, but there is not lacking evidence that there is a very considerable number of people who are overawed by a bookshop, and the better the bookshop the more they are overawed. They do not mind buying books so long as they need not enter a bookshop to make the purchase. It seems incredible, but there is evidence that it is true. It is possible to imagine a type of bookshop in which a person with only a shilling to spend would feel perfectly at home, and that without the bookshop ceasing to be true to its name. This is not the place for prophecy, but it does not seem unlikely that the next decade may see a development along these lines. It is only by some such means—by a mass movement that will bring a large accession to the book-reading and book-buying public, resulting in more copies being sold of each individual book—that we can hope for any considerable reduction in the present cost of books. D. R.

THE SIZE OF BOOKS

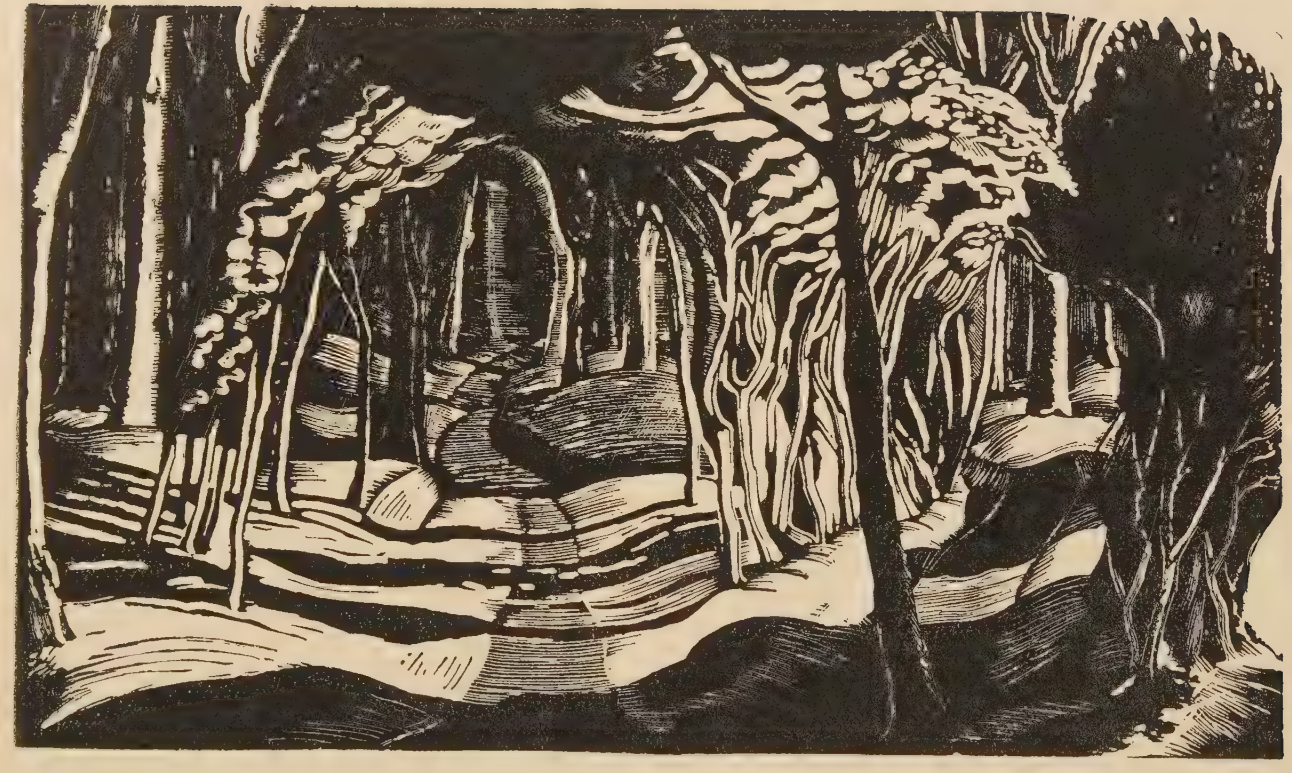
One occasionally finds book buyers of long standing who are frankly mystified by the description of a book as being Crown quarto or Demy octavo, and, as a matter of fact, there is no reason at all why the size of any book should be described to the public in this highly involved fashion.

Nor is there any reason why the size of a novel should not be described as 7½in. × 5in. instead of Crown octavo. Speaking generally, all books are printed on paper manufactured in standard sizes, the principal sizes being Crown (15in. × 20in.), Demy (17½in. × 22½in.), Medium (18in. × 23in.), and Royal (20in. × 25in.). If a sheet of Crown size paper is divided into two equal portions they will each measure 15in. × 10in., and this size is known as Crown folio; if it is divided into four equal portions the size is 10in. × 7½in., and the size is known as Crown quarto; if divided into sixteen equal portions the size becomes 5in. × 3¾in., and is known as 16mo, and so on. The same system of reckoning applies to Demy, Medium, and Royal size papers. That is all the mystery. For a variety of reasons the size may vary slightly. A considerable variation will only arise if a publisher for some special reason has had a supply of paper manufactured to his own specification and has chosen something other than a standard size. It will be noted that these different sizes and the various fractions of them give a publisher a wide variety, not only of size, but of shape—not only can he have a large page or a small page, but also a fairly square page or a comparatively narrow page. When illustrations or diagrams bulk largely in the make-up of a book the shape of the page becomes a most important point, and is one of the considerations that may induce a publisher to manufacture a special size of paper.

In some directions there is certainly a tendency to-day to reduce the size of books, and the popularity of uniform series of pocket editions has been one of the outstanding features of the trade during the last few years. It appears now to be the policy of several publishers to produce cheap editions of their non-fiction books in a uniform pocket edition series, whereas a few years ago they would undoubtedly have placed the cheaper edition on the market in a more bulky form. This new development has not been uninfluenced by the fact that so many people are to-day compelled for various reasons to live in smaller houses than their fathers; flat life is a characteristic of the age. There is less room to devote to housing a collection of books, and within reason people desire to get most into the smallest space. But the equally cogent reason is that there is an increasing number of people who realize that there is no reason in the world why they should be put to the discomfort of holding a large, heavy, cumbersome book in their hand while they read; any book can be produced—if the publisher and the public desire—in a size and weight that make it suitable for reading at home or on a journey.

Unfortunately, side by side with these efforts at a less bulky size of book there are books issued every year that are swollen outrageously in order that they may assume a value they do not possess. Admittedly the publisher has a difficult course to steer. Doubtless he himself would prefer a smaller size of book, but he has to bear in mind a section of the public not yet educated up to his own standard, and that section likes to see value for its money. It wants to put the books on the scales, or at least to pass a measuring rule across them.

An emphatic protest should, however, be made against a certain class of children's books known as "Bumper Books." They are bulked out by every device known to the printer and binder, and are devoid of anything in the nature of taste or refinement. The paper used is such that 100 pages make a book one inch thick. (On this basis the Forsyte Saga would have been nearly a foot thick instead of $1\frac{1}{4}$in.) The whole contrivance is an unavailing effort to persuade a child that a 2s. book has probably cost 5s. Children are not so easily deceived. If these ugly books are placed in the hands of children during their early and impressionable years, and if they are taught to worship bulk instead of beauty, what hope is there that in later years these same children will be allies of the publisher who is trying to raise the general standard of production? D. R.



Interior of a wood.—A wood-engraving by John Nash.

CHAPTER IV

BOOK PRINTING BY OFFSET

ILLUSTRATIONS AND TEXT

During the past few years many printers have given considerable attention to the possibilities of printing books by the offset method from zinc and aluminium plates instead of from type. This diversion was no doubt influenced to some extent by the methods and appliances introduced by the firm of Typary and Typon from Switzerland at the end of 1924. The method showed great possibilities, and the firm printed the whole of their book of instructions with photo-process illustrations, by offset from plates, without the use of metal type or etched blocks. The whole of the work was done by using large photo-sensitive films, such as are now on sale by some of the photographic material manufacturers and are playing an important part in many lithographic printing works.

Judging from the illustrations by the Typary and Typon firm, it is reasonable to expect that the method can be developed to suit colour work as well as the ordinary photo-process in black only. There are, indeed, two large printing machine manufacturers in Germany making machines for this purpose. They are known in the trade as the "Vomag" and "M.A.N." machines, and they are used in Germany for the production by the offset method of magazines, catalogues, &c., in colour and black. The "Vomag" machines are built in at least twelve patterns to suit book and magazine printing, and at least fifty weekly and monthly publications on the Continent are printed by them complete with illustrations, some in colours. One of these machines is installed in a printing works at North Watford, and is producing a large number of books annually. Any reader who sees a book evenly printed throughout on an unglazed paper, and the reading matter not impressed in the paper, may assume that it has been printed by the offset method. It will be noticed, too, that in these books there are rarely any broken letters or faint patches of lettering. This is largely due to the care bestowed upon the production by the photographic process departments.

The "M.A.N." machine enables two machines to be worked in cooperation to produce periodicals with coloured covers, with illustrated insides, folding and cutting the pages, binding the insides in the covers and delivering the whole paper, ready to have its edges trimmed—and delivered to the public. Just such a paper is *The Passing Show.* The catalogue of the "M.A.N." manufacturers is printed in Germany by their offset machines, and shows how far the process has succeeded in the printing of illustrations. A similar machine is made in England by Linotype and Machinery, Limited. The paper is fed into the machine from a reel, and after printing it is cut up and folded. A machine of this type installed in a printing works at Willesden Junction has been used for printing catalogues containing line and cross-line illustrations for books of music and for ordinary books. It is not, however, absolutely necessary to use these elaborate machines for book printing by the offset method. Several printers' engineers in England make offset two-colour and perfecting rotary machines which print 4,000 sheets an hour. These machines are highly suitable, as may be seen in the monthly issue of the *Modern Lithographer*, which, with its illustrations and cover, is produced by offset printing. The softness of the cross-line photo-lithography and the evenness of the type matter are particularly noticeable.

In the ordinary way it is possible to print by offset almost any kind of picture in one colour or in a correct combination of colours. Quite recently an exceptionally good three-colour print was executed by using the new Drytone inks. Generally the chromo-lithographs printed by offset require five or six printings. For book illustration in one colour, the work may be photo-lithographs direct upon the plate together with the text, or they may be transfers from copperplate engravings or collotype films. Even transfers can be put down from machine photogravure plates. Thus, in one way or another, illustrations of any kind can be printed with the text. Offset printing is suitable for any surface of paper, and dispenses with the "make-ready" as known by letterpress machine printers. It may, however, be some time before all users of web or reel offset machines become accustomed to any but the simple forms of illustration.

C. H.

CHAPTER V

PRIVATE PRINTING PRESSES

REVIVAL OF FINE PRINTING

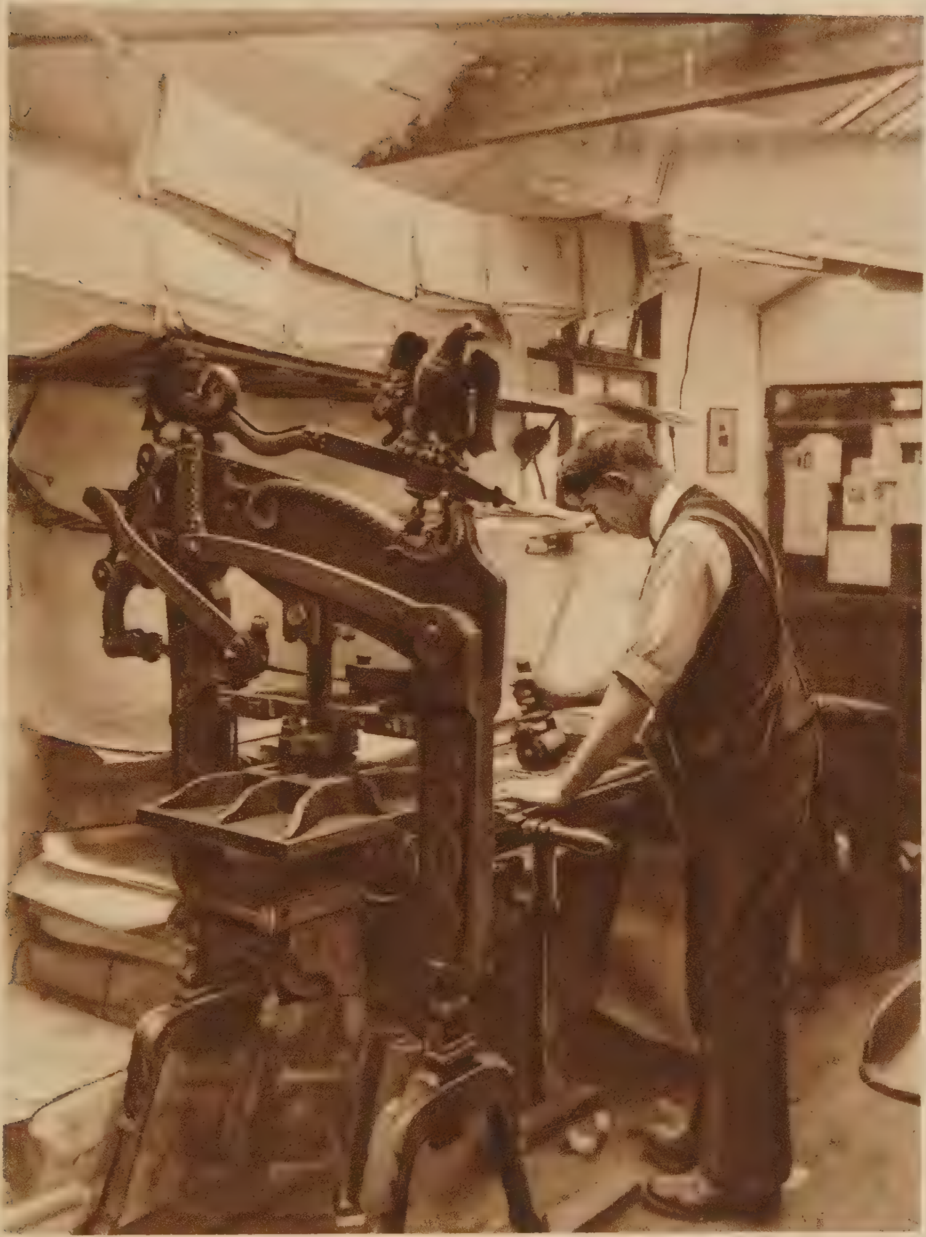
The writer of an article on "Private Presses" in *The Times* Printing Number of September 10, 1912, quotes from Anatole Claudin, the historian of French typography, his definition of a private printing press as one "set up at a monastery, a palace, a residence or a private house, not the residence of a professional printer." If at the head of these categories we add "a university," we have a definition wide enough to include all those presses which can strictly be called private. It may seem not quite fitting to embrace such great institutions as the University presses at Oxford and Cambridge within the same formula as the smallest hand-press set up by the country parson for printing his hymn-sheets and an occasional sermon. Yet in their beginning the Oxford and Cambridge presses were the property of their respective Universities; and wide as their operations have since become, and immense their services to learning, they still so remain.

Theodoric Rood printed at Oxford from 1478 until about 1485, and a second press lasted from 1517 until 1520. But the present Oxford Press dates only from 1585, and claims Robert Dudley, Earl of Leicester, who was then Chancellor, for its founder. The University lent £100 to Joseph Barnes, an Oxford bookseller, with which to carry on printing; and the Star Chamber gave leave for one printing press and also for one apprentice in addition to the master printer. In 1632 Archbishop Laud got for the University letters patent authorizing three printers, each with two presses and two apprentices; and a Royal charter of the same year gave the University the privilege of printing "all manner of books." Until 1669 the printing was done at the private houses of the University printers. In that year the press was installed at the Sheldonian Theatre, built by the munificence of Archbishop Sheldon at the instance of Dr. Fell, who in 1671, with three others, took over the management. Early in the eighteenth century it was moved to the

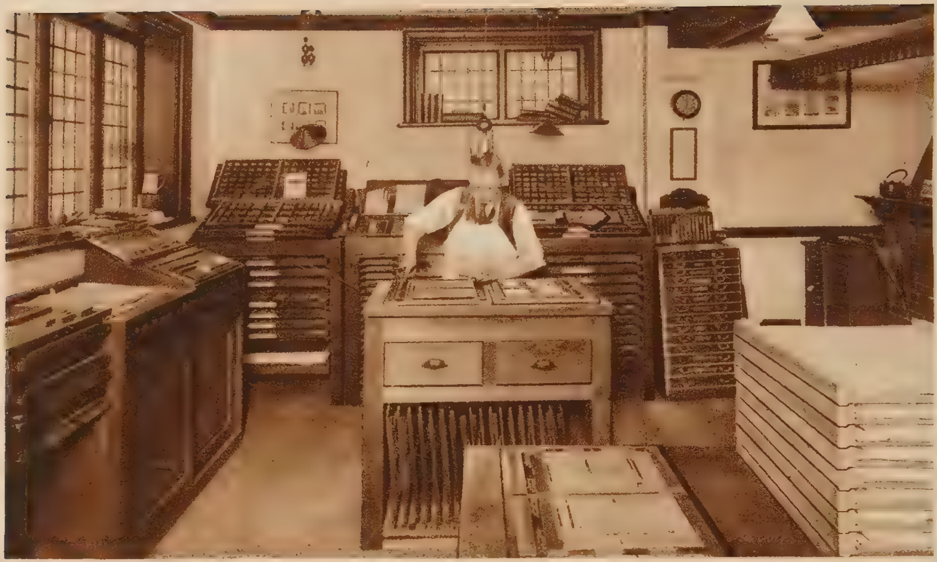
Clarendon Building, built for it chiefly out of the profits from the sale of Clarendon's "History of the Rebellion," the perpetual copyright of which is vested in the press. In 1826-30 it moved to its present great house in Walton-street.

It is impossible here even to hint at the extent and the value of the services which the press has rendered to letters and to learning in the course of its long history. No greater work has ever issued from any press than the Oxford Dictionary, the first sheets of which were printed more than forty years ago, and the last but the other day. The press has virtually no endowments and has no shareholders or debenture-holders. It depends on the sale of its books for means to carry on its work. It is governed by a delegacy, whose members are the Vice-Chancellor and proctors for the time being and ten others. Most of its books bear the imprint of the "Oxford University Press." The imprint "At the Clarendon Press" is now reserved for a much smaller number of books printed under the supervision of the Delegates and their Oxford secretariat. These selected books bear, therefore, the hall-mark of the University itself. The present printer to the University, Dr. J. de M. Johnson, succeeded the late F. J. Hall, M.A., in that office in 1923.

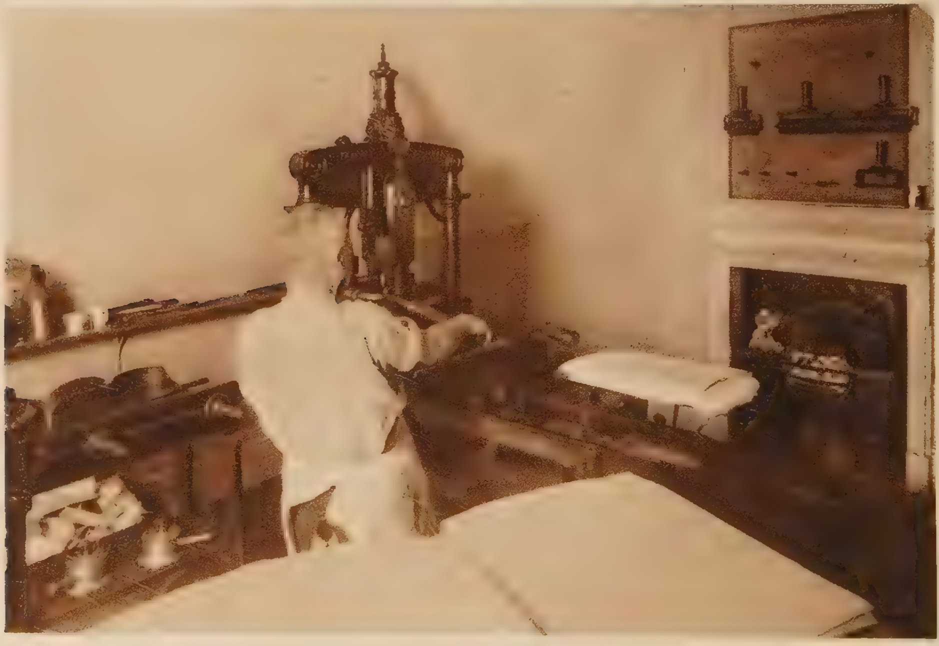
Printing began at Cambridge later than at Oxford, for John Siberch did not set up his press there until 1521. But the Cambridge University Press has a longer unbroken history than that of Oxford, for it received its first charter from Henry VIII. in 1534. Not till 1582, however, did the University appoint Thomas Thomas as its first printer. In 1698 the scholar Richard Bentley did for the Cambridge Press what Fell had done for Oxford a few decades earlier. At his instance the buildings were enlarged, new presses were set up, and founts of fine types were imported from Holland. A body of *curatores praeli typographici*, the direct ancestors of the Syndics of to-day, was appointed to control the press on behalf of the University. The governing body now consists of the Vice-Chancellor *ex officio* and of fourteen Syndics, chosen by the Senate of the University from among its members. Every book published by the press has to be approved by the Syndics. Since the times of Thomas Thomas the office of University printer has been filled without interruption. Thomas Buck, who was appointed in 1625, took for his printing-house the former refectory of the Austin Friars. John Field, appointed in 1655, built a new printing-house with a printing-room "sixty feet by twenty, [which] held six presses, had paper windows and a pleasant garden." Enlarged by Bentley, it housed the press down to



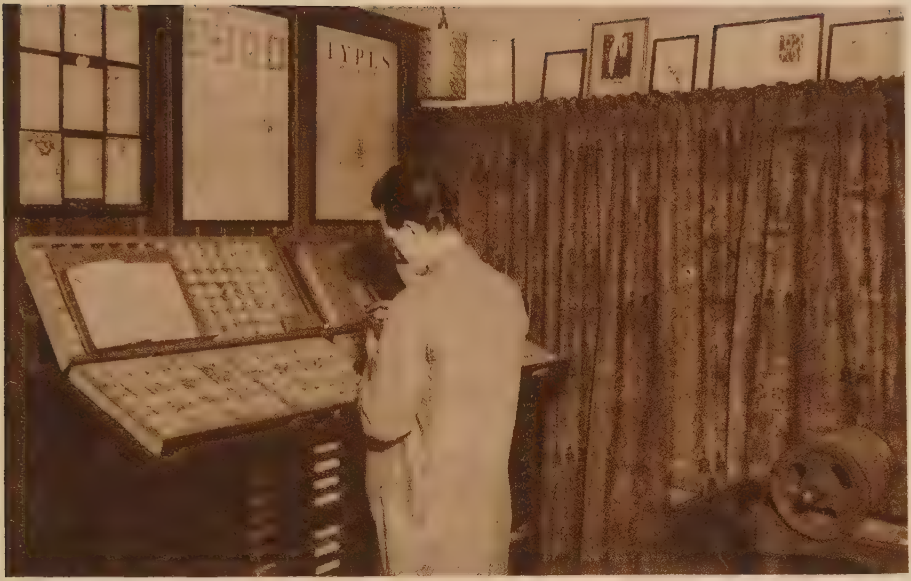
The Golden Cockerel Press, a well-known private press, at Waltham St. Lawrence, Berkshire. Our photograph shows a printer inking the forme before printing.



Another of the few private presses in this country is that of Mr. St. John Hornby, the Ashendene Press, Chelsea. A view of the case room.



A corner of the press room at the Ashendene Press; a printer taking a pull.



Composing room in the Nonesuch Press, Bloomsbury, London.

The book-binding room of the Gregynog Press, Newtown, Montgomeryshire.

The Clarendon Press, headquarters of the Oxford University Press, Walton Street, Oxford. The present building was built in 1826.

The Courtyard of the present building of the Cambridge University Press, which received its first charter in 1534.

1827. In 1831 the present Pitt Building was erected, part of the surplus of a fund collected for erecting a statue of William Pitt being given towards its cost. The most famous of the printers was John Baskerville, who, being eager to print folio Bibles and Prayer-books, entered into a short-lived agreement with the University. His great Bible was printed at Cambridge in 1763. Of late years the Cambridge Press has taken a notable part in the revival of fine printing. In the years 1917-19 the late J. B. Peace, M.A., who then held the office of printer, engaged Mr. Bruce Rogers as typographical adviser. In 1923 Mr. Walter Lewis, who had succeeded Mr. Peace, secured the services of his friend and former colleague, Mr. Stanley Morison, in the same capacity.

There is a notable example of a press belonging to a religious house at Manresa House, Roehampton, the novice-house of the Jesuit Fathers of the English Province. The Manresa Press has some claim to represent that set up at the English college at St. Omer, founded by Robert Parsons in 1592. From St. Omer during the seventeenth and eighteenth centuries issued a long series of books for the instruction and consolation of the Catholics in England who were oppressed by the penal laws. Among the important historical works which have been printed at the Manresa Press may be mentioned Foley's "Records of the English Province of the Society of Jesus" and the series illustrating "The Troubles of our Catholic Forefathers," edited by Father John Morris some forty years ago. Another religious press is that owned by the Benedictine nuns at Stanbrook Abbey, near Worcester. Many of the books printed there are studies of the plainsong and liturgy which fill so large a part of the Benedictine day. Both the type-setting and printing are done by the nuns themselves. When their first Columbia press was set up in 1876, with a light-hearted ambition which will be fully appreciated only by those who have themselves worked a private press, they proceeded to print a great folio Ritual in red and black.

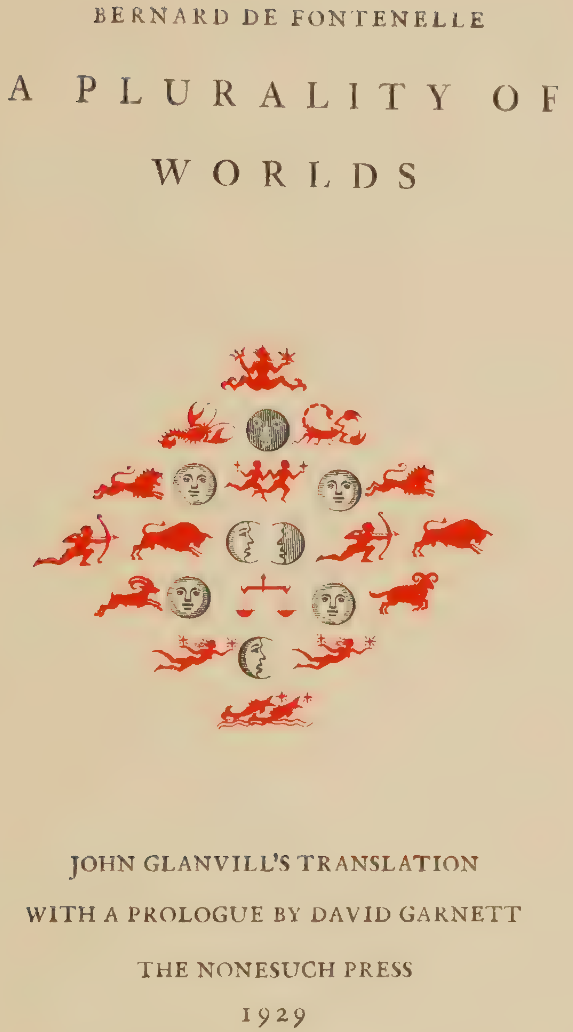
A country parsonage often proves to be the congenial habitat of a private printing press, whence there sometimes issue learned and valuable works, so limited in their appeal that they might never have seen the light through the ordinary channels. A historical example is that of the Rev. Francis Blomefield, who in 1736 set up a press and began printing in serial numbers his great "History of Norfolk." The King's Stone Press is worked by the Rev. William Manton, vicar of Long Compton in Warwickshire, with the help of some of the village lads. He has lately printed there the History of Steeple Aston in Oxfordshire, written by the Rev. C. C. Brookes, the vicar of Duns Tew.

At the High House Press, Shaftesbury, Mr. James Masters shows how delicate and dainty work may be done with a hand-press and a very small equipment of type. In hours spared from their ordinary avocations he and his wife have printed a number of small books containing selected pieces of ancient verse or collections of original poetry.

The Gregynog Press was set up a few years ago near Newtown, Montgomeryshire, at the instance and cost of the Misses G. E. and M. F. Davies, as part of a greater scheme for the encouragement of Welsh craftsmanship. It is worked by Mr. R. A. Maynard, who is also a wood-engraver and has printed many fine books, mostly by Welsh authors, embellished with his own work and that of his colleague, Mr. H. W. Bray. They include "The Autobiography of Lord Herbert of Cherbury," in folio, and, in octavo, selections from the writings of George Herbert and Henry Vaughan among the ancients and of Edward Thomas and W. H. Davies among the moderns.

The Kelmscott and the Doves Presses survive only in their books, still treasured above all others by collectors, and in the fruitful influence which they still exercise, directly or mediately, on the finest printing in Europe and America. With the names of these two famous presses there will always be linked that of the Ashendene Press, which is still happily working in the house at Chelsea to which Mr. St. John Hornby moved it so far back as 1899. The folio Dante of 1909, a page of which was reproduced in the 40,000th number of *The Times* in 1912, has been followed by four more great folios printed in the same rich "Subiaco" type —Malory's "Morte d'Arthur," Boccaccio's "Decameron," and Spenser's "Faerie Queene" and "Minor Poems"—and, in quarto or octavo, by a Vergil, a Lucretius, the "Vita di San Chiara," and the "Fioretti" of St. Francis. Since then Mr. Hornby has had cut his "Ptolemy" type, a fine roman letter taking its name and its character from the Ptolemy printed by Holle at Ulm in 1482. He is using it for his folio edition of Shelton's translation of "Don Quixote," of which the first volume was finished in 1927. That noble book is decorated with initial letters and borders designed by Louise Powell. With two more of Mr. Hornby's great folios it was the outstanding feature of the exhibition of books illustrating modern printing held in the King's Library at the British Museum. In some quarters it has of late become the fashion rather to depreciate the work done by Morris at the Kelmscott Press. At the Ashendene Press the Kelmscott rule is kept unrelaxed; and these glorious books show how sound were the principles and the craftsmanship which Morris himself learned in part from the earliest and greatest printers.

B. H. N.



BERNARD DE FONTENELLE

A PLURALITY OF
WORLDS

JOHN GLANVILL'S TRANSLATION

WITH A PROLOGUE BY DAVID GARNETT

THE NONESUCH PRESS

1929

Title-page of Mr. David Garnett's edition of "A Plurality of Worlds" (London, Nonesuch Press, 1929).

PART IV

ILLUSTRATION IN MONOCHROME AND COLOUR

CHAPTER I

THE VARIOUS PROCESSES

PRINTING SURFACES

The production of printing surfaces for the making of illustrations dates from 1826, when Nicéphore de Niepce made the first engraving on metal by photographic means. It is interesting to note that with his sensitive bitumen film he had at the same time produced the first permanent photograph. From this beginning photo-engraving methods have developed until at the present time there exists a technique which can produce prints in monochrome or in colour upon any kind of paper and suitable for any purpose. All three possible methods of printing have been utilized by the photo-engraver. The earliest of these is the typographic method of printing, in which the design to be printed is raised to a flat level of the height of type. The second oldest is the intaglio method, first developed in the fifteenth century for the production of hand-printed engravings, utilized in his successful experiment by Niepce, and now in the form of rotary photogravure capable of producing extremely fine illustrations on comparatively common paper. The third method of printing is lithography, originally a method of printing from the flat surface of a fine-grained limestone, but now developed to rapid printing from metal on rotary machines. Each one of these three methods of printing is able to print the ink on certain parts of the paper while the others are left with their original whiteness untouched. In the typographic method it is a flat surface which takes the ink and transfers it to the paper, and where no ink is to be printed the plate is recessed below the printing level. In the intaglio method the printing plate is polished and has recessed into it holes of varying sizes and depths, so that they hold varying amounts of ink, while the smooth surface has the ink wiped away from it. In lithographic printing the printing surface is practically smooth, but it is porous, and the pores can be filled either with grease or with water. The image to be printed has the pores filled with grease. The operation of printing comprises a damping of the plate or stone which ensures that every part of the plate that is not greasy is kept wet, rollers charged with a greasy ink then pass over the surface and the ink takes only on the parts that are already greasy, not at all upon the parts that are wet. Paper is then applied with sufficient pressure to lift off the ink.

In the preparation of printing surfaces for all the above three methods of printing the chief agent which is now used is a gelatine sensitized to light with a bichromate, and the first discovered sensitive surface, that is, bitumen, is seldom used. Gelatine and also fish-glue and albumen in the ordinary dry condition and containing a bichromate become on exposure to light harder and less soluble. This is applied in half-tone "enamel" printing, lithographic printing down, and in Vandyck work by using a very thin film of the bichromated gelatine, and so exposing to light under a suitable negative that the film is insolubilized right through its thickness to the supporting metal, so that in development with water, usually cold, the still soluble portions are washed away, leaving an image in gelatine upon the metal. In collotype and in photo-lithographic transfer work advantage is taken of the varying amounts of water imbibed by a film after exposure to make the surface of the film take up more or less ink; while in photogravure bichromated gelatine is employed to secure a relief, and in this process it is the thickness of gelatine on the plate which controls the depth of etching. Of recent years there has been added to the list of available light-sensitive substances some of the lacs and synthetic resins. These substances are soluble in alcohol; some are themselves sensitive to light, others are sensitized like the water-soluble gelatine by adding a bichromate to the solution. The solution of bichromate and resin is applied to the surface of the metal plate to be used for printing, in much the same way as glue or albumen. A thin film is obtained on drying, and on exposure to light the exposed portion becomes insoluble in alcohol. The method has distinct advantages as regards coarse half-tone work on zinc and some lime work, for the reason that when a cold water soluble gelatine, such as fish-glue, is used for obtaining a print on metal, this, after development and drying, has to be hardened by being heated, a process known as "burning-in," and this heating causes the zinc to change its normal structure so that the internal crystals of zinc of which it is composed become much larger, and hence the sheet becomes brittle. As the "burning-in" is not necessary to obtain a resist with these resinous bodies, this method of obtaining a print on metal has secured some considerable use during the last few years. The solution used is often spoken of as "cold-top."

In the letterpress method of printing, ink is printed from the flat tops of the type or blocks. Except for the small adjustment made during "make-ready" there is no alternative to the printing of solid ink or no ink, and intermediate tones can only be imitated by printing a fine stipple of dots or lines arranged to cover a varying portion of the paper surface. The one method which has accomplished this purpose with real success is that known as half-tone, where an illusion of light and shade is obtained by a series of equally spaced dots which vary in size, while a slight variation in shape often helps to suggest fine detail. This scheme for getting the effects of light and shade in typographic work was visualized by experimenters certainly as early as 1850, and it was during the following decade that Fox Talbot carried out most of his pioneer work in photo-engraving. Many schemes were tried for obtaining a transition from the light and shade of a photograph or drawing to something discontinuous which could be used for printing, and the problem was finally solved about 1880, when the cross-line screen was produced and used. This screen consists of two sets of opaque black lines etched into glass and cemented together so as to cross each other at right angles, and it is held parallel to and a little in front of the photographic plate when making the exposure to produce the half-tone negative.

Half-tone screens constructed in this way have remained in use to the present day without any change, except perhaps a slight improvement in quality and uniformity, and during this period the improvements that have taken place in half-tone illustration are due to the increasing skill of the workmen and a knowledge of the optical problems involved. It is known that even when used with the greatest skill and under the best conditions the half-tone screen does not give a facsimile rendering of light and shade, and some retouching (fine etching) has to be done upon the block before it is ready for the printer.

There have been many attempts to produce screens in other ways and with other patterns, but these efforts have so far only resulted in the use to a very limited extent of certain irregularly grained screens and others with varying angles and numbers of rulings. Few of these have, however, had much vogue, and more than ninety-nine per cent. of the half-tone blocks are made with the screen with the right-angle rulings. One recent attempt at another type of screen is worth recording, that of Ronald Trist, where the screen is placed in contact with the photographic plate, and, instead of sharply defined lines, has a number of dots which are graded all in the same way. This gradation is so adjusted that the resulting negative can give a very close approximation to correct reproduction of tones.

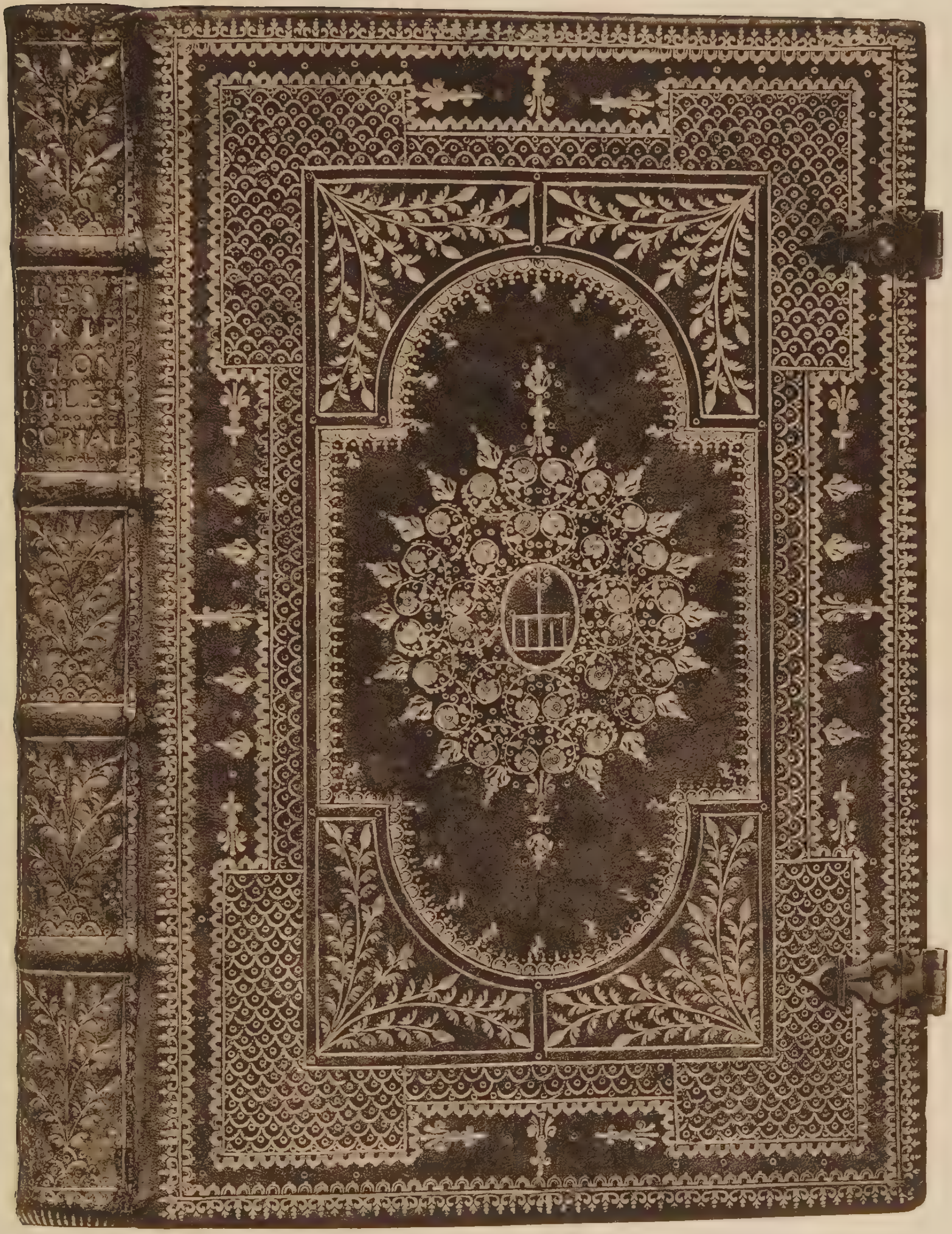
The half-tone method is now applied extensively to photo-lithographic work as well as to the making of blocks for letterpress printing. There has, however, been the difficulty that retouching cannot be carried out as easily on lithographic plates as it is when the blocks are etched for half-tone, and this has hampered the development of work along these lines. In the last few years there has been a great development in the application of half-tone to offset lithographic printing, and although most of the firms concerned have worked out methods of their own for retouching, there is as yet no widely recognized and uniform method such as exists in the making of half-tone blocks. It is, however, probable that the next few years will see these various methods of retouching for lithographic work become standardized. The application of the half-tone method to photo-litho offset printing has enabled prints in imitation of continuous tone to be obtained on paper of any desired degree of roughness—whereas in half-tone block printing the paper has normally to have a very smooth surface in order that it may take the proper impression of every dot, however small—but recently the blockmakers have by deep etching and other devices been able to produce some excellent effects from half-tone blocks on matt-surfaced papers.

The collotype method of producing photo-engraved prints has changed but little since its invention in the sixties of last century. The only notable alteration which has taken place of recent years is the introduction of the Sperati plate, which has enabled more than the usual thousand copies to be pulled from one plate before the life of the plate is finished. It is almost certain that the total volume of collotype work produced has become considerably less during the last fifteen years.

One interesting development which has taken place in America is somewhat on the lines of collotype. This is the Aquatone process. This process is stated to make use of thin zinc plates coated with a smooth gelatine film which can be sensitized in bichromate. These plates, after drying, are exposed to light under negatives which are black and white—that is, they are either "line" negatives reproducing black-and-white designs or type, or they are half-tone negatives consisting of dots of varying sizes. In this way parts of the film of gelatine are rendered hard, so that they do not imbibe water when the plate is wetted, but do take the ink from the rollers. The printing is carried out on rotary machines, and the life of the plate is stated to be a fairly long one. The specimens of work which have reached this country are most of them very good and indicate that a quite fine half-tone screen has been used, much finer than is suitable for making blocks. It will be noted that the process differs from collotype in the gelatine having a smooth surface instead of a finely reticulated one, and in not dealing with the variation of tone in the way that the collotype plate does, but in utilizing the half-tone method.

During the last few years there has been introduced into printing, and particularly to the printing of half-tone, an application of the use of chromium. This remarkable element is extremely hard and may be electrolytically deposited upon copper blocks and so give them a surface which, although thin, is highly polished and untarnishable, and will wear throughout extremely long runs. The use of chromium has proved of great value to the printer in rendering the duplication of blocks by electrotyping unnecessary in many cases, and has also ensured that throughout runs of almost any length the work is uniform.

The three-colour process is one which has always had attractions for the printer because it offers the possibility of securing prints in colour with only three impressions. The great advantage of this process over the old methods of printing in many colours, as practised by the chromo-lithographer, is obvious on the score of economy, but it has presented numerous difficulties. It only became possible to apply it widely after really suitable photographic plates and filters had become available about 1906, and the great improvements which took place about that period have been followed up by a steady development in detail. The method is more applicable to half-tone than to any of the other reproduction methods, because in half-tone the tones on different parts of the block can be readily varied during etching, and in this way all the various defects of the process can be corrected and just that size of dot secured which will print the appropriate amount of ink. This, of course, implies considerable skill on the part of the colour etchers, but that skill has been steadily developed, and now there is coming to the aid of the etchers grades showing the requisite sizes of dots in all three plates in order to secure the desired colour in the final print. As regards the inks which are used for this purpose, it has been


DES
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Spanish Sixteenth Century Binding

Collotype Reproduction by Whittingham & Griggs, Ltd.

known for a long time that it is not possible to get exactly the right hues, for two of them are colours which do not appear to exist among dyes or pigments, but the etcher can allow for the defects due to this cause. What is being done at the present time is to make the attempt to persuade all block-makers and printers to use one standard set of colours instead of almost every printer having his own pet set of inks. When this improvement is accomplished it will mean that blocks produced by different engraving houses can all be printed together without any of the colours being in error. Another great improvement which is being effected now is to apply to printing inks some recent discoveries which make certain colours very fast to light, so that three-colour prints can now be made much more permanent than was formerly the case.

The application of the three-colour method to photo-lithography and also to photogravure has presented special difficulties because it has not been possible to retouch the printing plates or cylinders with the same ease as in the case of half-tone blocks. But these difficulties have already been very largely overcome, and excellent three and four colour work is now being done by these methods.

It may be mentioned here that the use of a fourth printing in black or grey is often employed in this class of work to improve the darker tones and greyish colours, for it is obvious that when neutral tints have to be produced by the successive printing of three bright colours, such as the red, yellow, and blue inks used in this work, a very precise balance must be maintained between the printings.

A variation on lithographic printing is the use of an amalgam or mercury alloy as an ink-repelling surface in place of wet stone. This property of amalgams has been developed to its highest point in the Pantone method, in which the printing plate employed is flat and the part which is to print the design is chromium, while that which repels the ink is copper-silver amalgam. This method, which is only now being developed commercially, is able to print fine or coarse work at a great speed upon varied types of paper, and has the advantage over typographic printing where line work has to be etched that extremely fine lines can be preserved and printed without any loss. Since the printing surface is chromium, the edition which may be printed from a single plate is practically unlimited. In its latest form this method makes use of a pyro-tanning process in order to obtain the image directly on the printing plate, thus avoiding the necessity of making a negative and then printing on the metal.

A. J. B.

THE ARTIST AND THE PRINTER
NEED OF COOPERATION

Before the introduction of photographic methods of illustration, the artist himself frequently cut or engraved his metal plate or wood block, and consequently secured harmony in his prints. Both wood-cutting and wood-engraving have their limits of expression, as has also lithography; and the beauty of an etching, aquatint, or mezzotint arises from the recognition by the engraver of the qualities and limitations of the printing medium.

Unfortunately the communion between the artist and the printer decreases as the industry develops, and in place of the artist being a printer or working in close touch with one, a new organization has grown providing little or no connexion between the designer and the printing press. The result is that artists have become isolated: they have gone their own way, and perhaps developed styles out of harmony with the printing medium. It may even happen that a brilliant artist deliberately strains the resources of the reproduction process. But such methods can at the best give only a passable interpretation of his intentions.

The most successful illustrators proceed on different lines, and by studying the characteristics and capacities of modern reproduction are able to exploit them to the full. It is easy for an artist to obtain new and striking effects in photographic reproduction if he will cooperate with the engraver and the printer rather than create difficulties for them to overcome.

Designs for reproduction by modern photographic methods should possess definite technical qualities, and be free from certain defects: each of these processes is limited in its application, and the drawings which are free from such imperfections give the best results. For example, a pen drawing should have solid black lines, and their edges should be free from rough serrations. The "quality" of a pen drawing originates in the "feeling" of the individual lines, and this "feeling" is preserved in a successful reproduction. Should the lines be scratchy or broken the process accentuates the defects, and much of the spirit of the drawing is lost.

In the half-tone reproduction of wash drawings there is a limit of interpretation in the block itself. There is also the additional factor that closely packed shadow detail in large areas is in danger of becoming a smudge, particularly in rough printing. A mixture of media such as pure wash and body-colour is liable to suffer a change in tone values and even in texture. A careful study of the original work of successful black-and-white artists, and particularly the reproductions in the less well-printed magazines and newspapers, is well worth while.

In colour work the three-colour process has definite and well-recognized defects in the range of colours that can be correctly rendered. Certain greens and purples, for example, cannot be reproduced by standard inks. Where a gallery picture including these colours is to be reproduced the difficulties have to be overcome and the nearest approximation to the correct colours obtained. But when artists are preparing coloured originals specifically intended for reproduction by the three-colour process, it is more satisfactory to omit the difficult colours from the colour scale: this assists the publisher in selecting a drawing, and the work of engraving and printing is greatly simplified.

Illustrators are now seeking new means of expression by reverting to the woodcut, the auto-lithograph, and the etching; yet there remains considerable ground to be explored in photo-illustration processes if artists will rely on the variety of the new technique instead of working on conventional lines.

R. B. F.

CHAPTER II

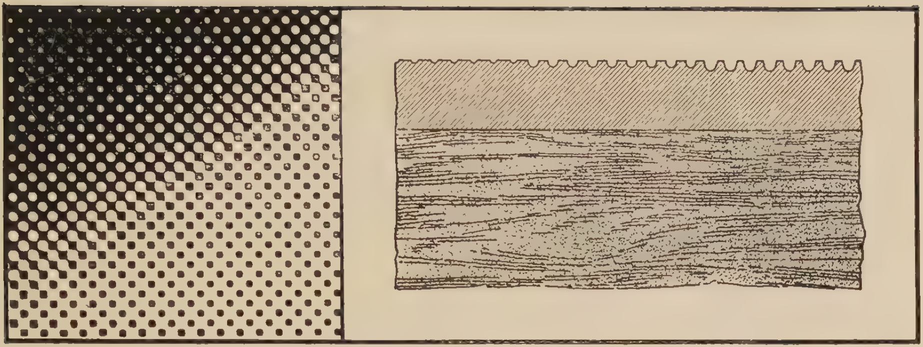
PHOTO-ENGRAVING

THE HALF-TONE PROCESS

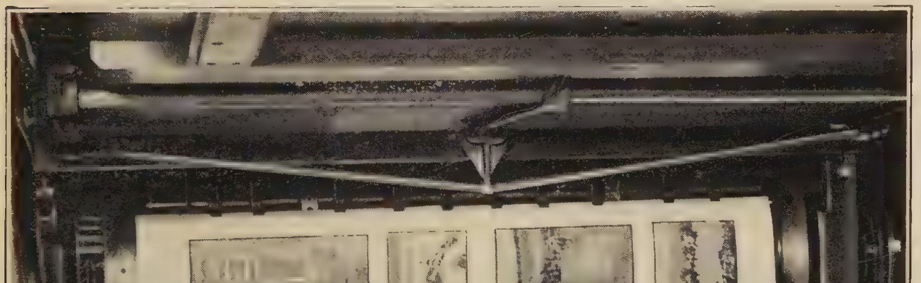
Photo-engraving originally comprised the zinc-etching process for reproducing line originals and the half-tone process for photographs and shaded drawings, but now it embraces a variety of processes for the production of blocks for letterpress printing, including the highly developed three-colour and four-colour block processes. "Line" may mean anything that is in black lines, such as pen drawings, type matter, lettering, writing, ornament, or solid masses of black on a white, or more or less white, ground. It is also possible by this method to reproduce originals printed or drawn in colour, so long as the colour is not shaded, otherwise than by lines, into tints or tones, and provided that the design stands out clearly on a light ground, even though the ground is also coloured, for the photo-engraver can use colour filters to make the design to be copied equivalent to black and white. Shading can be simulated by cutting up black masses or thick lines with the aid of single-line ruled screens placed in front of the sensitive plate, as in half-tone negative making, thus producing what are known as "half-line" blocks.

Shaded effects in lines, dots, grain, stipple, or cross-lines can also be produced by means of "shading mediums," which are gelatine sheets on which the pattern is in relief so that it can be inked and impressed, before the etching is done, on the plate bearing the outline drawing. Blocks produced in this way are useful in certain simple forms of colour work, such as is used in comic illustrated papers and in fashion journals, full colour being obtained by solid masses.

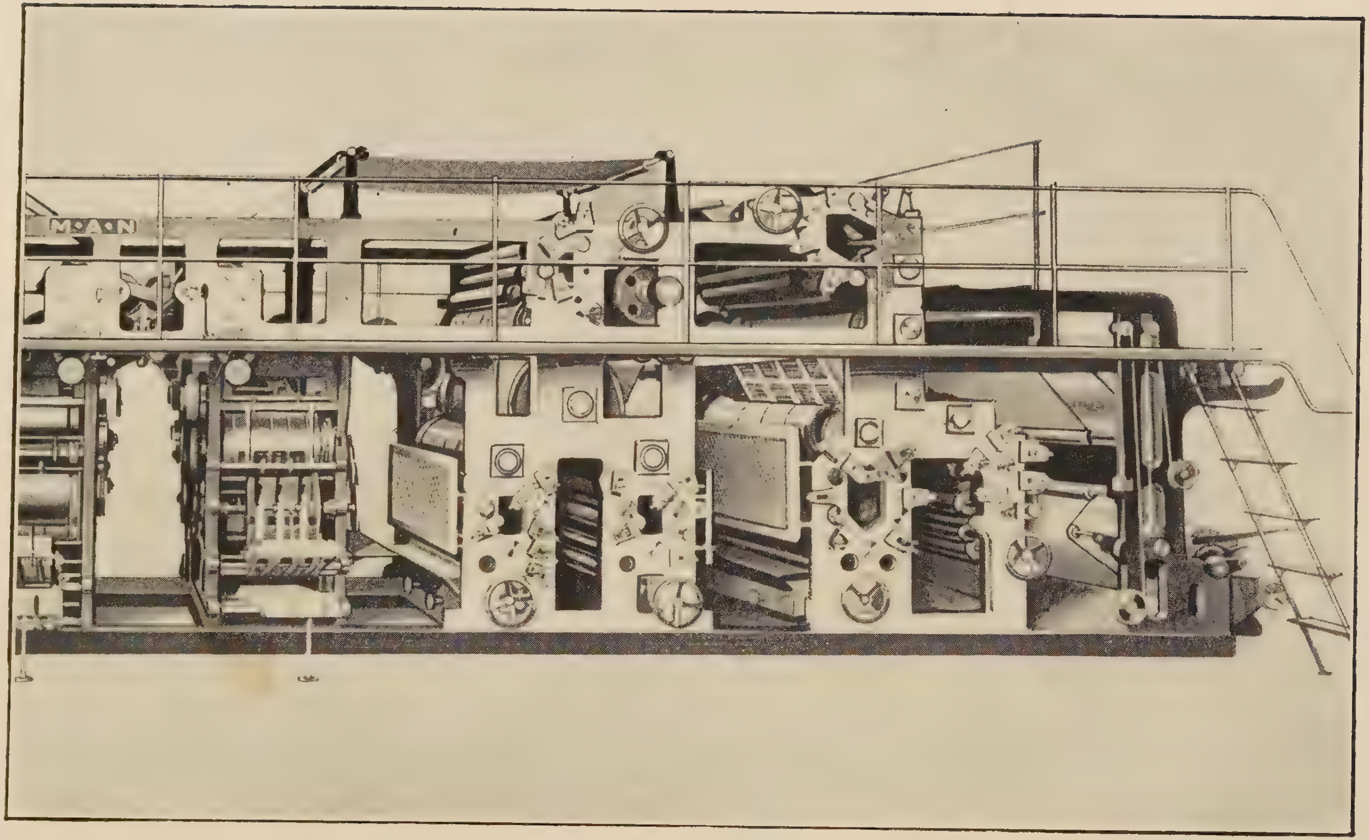
Thus line blocks are used for very diverse purposes of illustration. They are almost invariably etched on zinc, and constitute the cheapest form of illustration, with the additional merit of being easy to print on any kind of paper. For very fine line work copper is sometimes used.



Two sections, considerably enlarged, of a half-tone block showing how the screen produces the printing surface of the block. The illustration on the left shows the dots formed by the screen, the intervening white being where the metal has been eaten away by the acid, while the cross-section gives an excellent example of how these dots, which form the printing surface, stand above the rest of the metal.



Printing from half-tone blocks. The paper on the cylinder can be seen after having passed over the blocks on the bed of the machine.



A multicolour rotary newspaper press, specially built to print colour illustrations in a daily newspaper. It is in use in a Warsaw daily newspaper office and was made by the M.A.N. Company of Augsburg, Bavaria.

Facing page 101

The use of etching machines, which splash or spray the acid on to the plates, instead of the old method of rocking in a tray of acid, has now become almost universal. These machines have greatly speeded up the work, and the plates are etched deeper and smoother; but it cannot be said that the quality has been improved, for to-day nothing like the perfection of some of the zinc etching which was produced in the old days by the simple means of the rocking bath, the ink roller, and the resin brush is attained. It was then a matter of highly skilled craftsmanship, while now it is more akin to the methods of mass production.

The "dragon's blood" process, which consists in strengthening the lines between the stages of etching with a red resinous powder, instead of with waxy ink and white resin, was imported from America and is now largely used. It is quicker than the old "rolling-up" process, but hardly produces such a good quality printing plate. The shouldering of the lines is not so smooth as in the older process, and consequently the plates are not so good as the old ones for stereotyping and electrotyping. In some shops a combination of the old and new processes is employed with better results.

One thing which has contributed to the improvement of line blocks from the printers' point of view is the largely increased use of routing machines for clearing out the large white spaces, which in the old days had to be etched out or cut away by fret-saw and chisel. Well-routed blocks also save a good deal of time in stereotyping and electrotyping.

The half-tone process has been brought to the highest degree of perfection it is perhaps possible to attain. It reproduces those originals which cannot be handled by the line process because of the varying amounts of light and shade, as in a photograph or a wash drawing. The term "half-tone" originated from the process being described in the early days as one for reproducing the half-tones of a photograph or other picture. The results are obtained by a device which is really an optical illusion, by breaking up the image into dots of such fineness and closeness that to the naked eye the effect of continuity of tones is obtained. Even in the case of the relatively coarse dot effect seen in newspaper half-tones this blending of the dots into a uniform tone is secured with quite satisfactory results.

This breaking up of the image into dots is obtained, as is now generally well known, by means of a "screen," which is a network of fine black lines ruled on glass, this being placed in front of the sensitive plate during the exposure for the negative. The dots produced vary in size according to the light and shade of the picture—tiny pin-point dots in the high lights, or whites, larger dots in the half-tones, and still larger dots, tending to join together, in the shadows. This gradation, which is brought about by the variation of intensity of light reflected from the different tones of the picture, can easily be seen by examining a half-tone print with a magnifying glass. To the layman the reason for thus splitting up the picture may not be fully understood, but the practical printer knows that every element of a printing surface in typography can receive only a uniform film of ink; one cannot deposit more ink on some parts of the picture and less on others. The effect of light and shade, therefore, can be obtained only by larger or smaller dots, each carrying the same amount of ink on their surface, but by their difference of area presenting more or less strength to the eye.

The process of making half-tones by printing the screen negative on to zinc or copper, coated with a solution of fish-glue made sensitive with a bichromate salt, and afterwards "burning-in" to form an enamel-like resist for etching, is fairly well known to those who have interested themselves in process work, and others will find details in trade handbooks.

There has actually been no important change in the methods of producing half-tone blocks since about 1895, when Levy screens and the fish-glue process were imported from America. Apparatus has been improved and devices have been applied to the camera and lens for obtaining the correct distance between screen and sensitive plate and the best size and shape of diaphragm for securing the proper dot effects. Illumination is invariably by means of powerful arc lamps, which have been considerably improved in recent years.

As in the case of line plates, half-tones are usually machine-etched, but for copper the mordant is perchloride of iron, which has to be used in separate machines from those for zinc, where nitric acid is employed.

In the last year or two electric etching has been introduced, the plates to be etched forming the anode, and the kathode being of a special kind of steel. The electrolytic solution is a mixture of the chlorides of sodium and ammonium, and it is kept in agitation during etching by means of an air blast. A first etch of two-and-a-half minutes will give a depth of two-and-a-half thousandths of an inch, and deep-etched plates are obtained in from seven to twelve minutes. The etching produces smoother shoulders to the dots without undercutting, so that the plates are good for stereotyping and electrotyping, as well as for direct printing; at the same time the tone values are well retained.

So far it has not been found possible to apply this process to zinc etching, but line plates are being produced on a special kind of metal resembling brass.

A demand has arisen for half-tone blocks for printing in black or colour on rough-surfaced papers, and this has been met by a process introduced under the name of "Tintex," in which the plate is etched in a special manner—chiefly with greater depth and smoothness in the high lights. By using hard packing and a suitably cut overlay, or a mechanically made overlay, successful results have been obtained even on common newsprint paper. Other processes of the kind are "Suntone" and "Swaintone." The blocks are somewhat dearer than ordinary half-tones, but the process has the merit of enabling letterpress printers to compete with offset lithography.

A recent development of half-tone is the production of what are known as high-light half-tones. They yield a block which will print so as to leave pure white paper in the parts which should be white instead of being covered with very fine dots, as in the ordinary process. It is also found that the other tones have been brightened up. This effect is obtained either by the use of a special lens having a double cross of slits in the diaphragm, or by manipulation of the ruled screen, the former method being the latest and most successful.

Half-tone blocks have been made with two different screen effects on the same block, but without much advantage other than its novelty. Some years ago efforts were made to employ screens other than the usual pattern of cross-line ruling, such as "four-line" screens, "wavy-line" screens, and "grain" screens, but none of these innovations has survived the first introduction. Half-tone seems to have become standardized on present lines, and unless some radically new method is brought forward, which at present is not in sight, it does not seem likely that there will be much change. W. G.

CHAPTER III

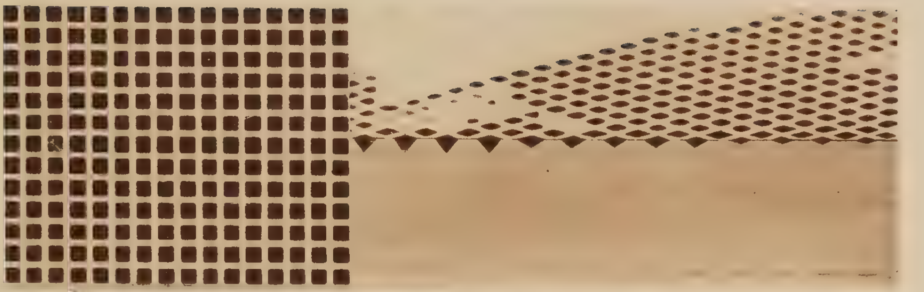
PHOTOGRAVURE

FLAT PLATE AND ROTARY

The term "photogravure" really applies to two distinct processes, which, though based on the same principles, occupy different fields in the printing arts. Photogravure, as originally invented and so called, is a process of producing an etched copper plate from a photograph, or from an original that can be photographed, for the purpose of taking impressions on the hand-press by the old method of copperplate printing. The etching is intaglio and is of varying depth in proportion to the strength of the tones of the picture: thus the shadows which are etched most deeply hold most ink and the lighter tones take ink proportionately.

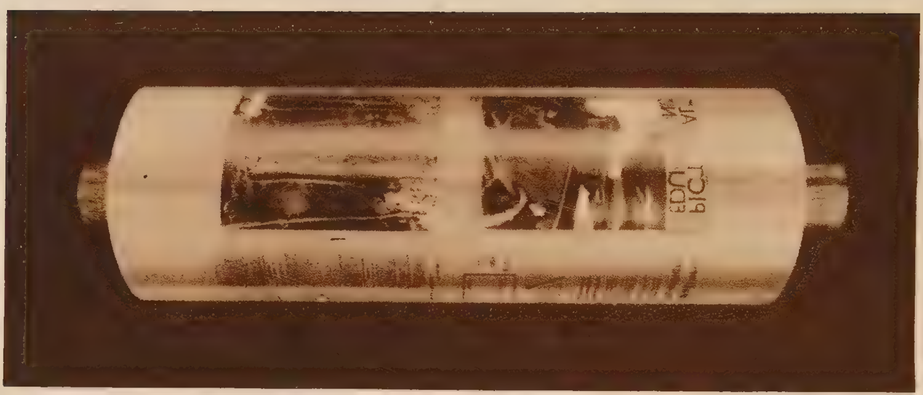
Ordinary photographic negatives of good quality are the basis of the process, and from them equally good positives have to be made. From these positives a print on paper coated with pigmented gelatine (called carbon tissue) is made, the paper being sensitized with bichromate. No screen is employed, but the plate has to have a grain of powdered bitumen or resin deposited on it to hold the gelatine film and to give a roughened character to the etched parts, so as to make them hold the ink. The gelatine image becomes more or less hard, according to the light action through the varying tones of the negative, and this holds back the etching solution so as to produce a varying depth. For printing, the plate is rubbed in with ink and the surplus wiped from the surface. Damped paper is impressed by means of a powerful roller press.

Though photogravure seems an uncommercial method in these days of rapid printing and large editions, the process still flourishes for certain classes of work where cost is not the most important consideration. Such work is mainly that of producing frontispieces and plates for high-class books printed in limited editions; it is also largely used in producing prints for framing, as sold in the printsellers' shops.

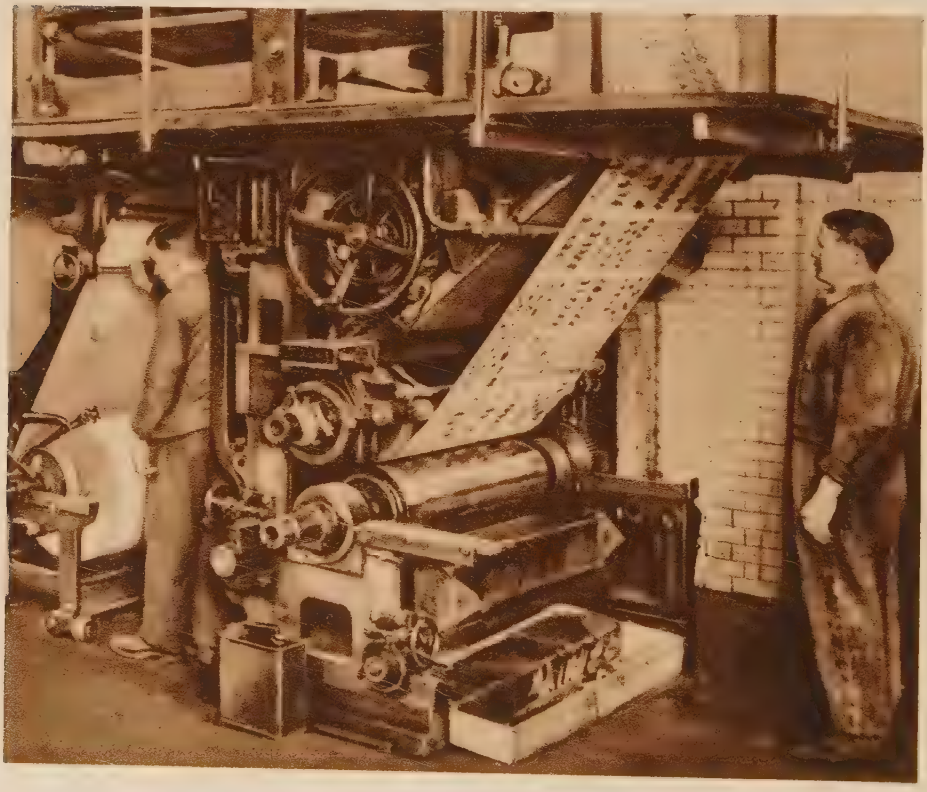


Two similar sections of a photogravure plate. This process is the direct opposite to half-tone, as the depth of the hollows formed by the screen govern the light and shade of the picture. The first picture shows the effect of the special screen and the second a section showing the varying depths of the hollows from which the paper takes the ink. Both of these diagrams are greatly enlarged.

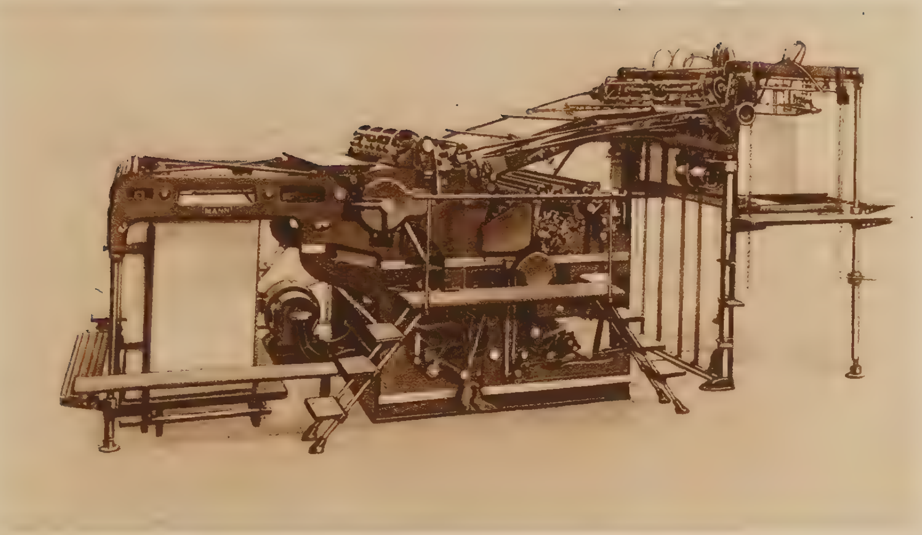
The matter for reproduction is photographically printed on to carbon tissue, which is shown above being placed on the copper cylinder. The paper is then removed and the image etched in the copper.



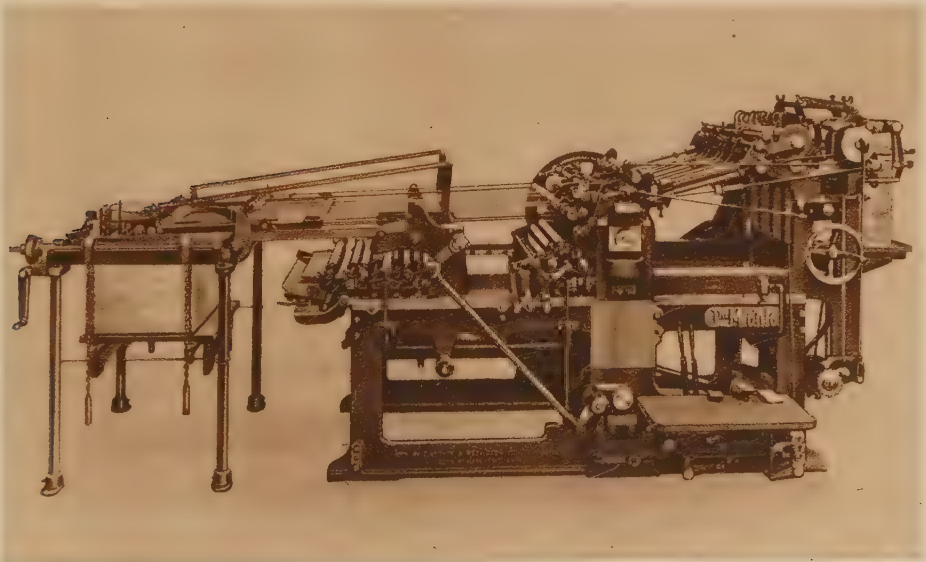
The finished Photogravure copper cylinder ready to be placed on the printing press.



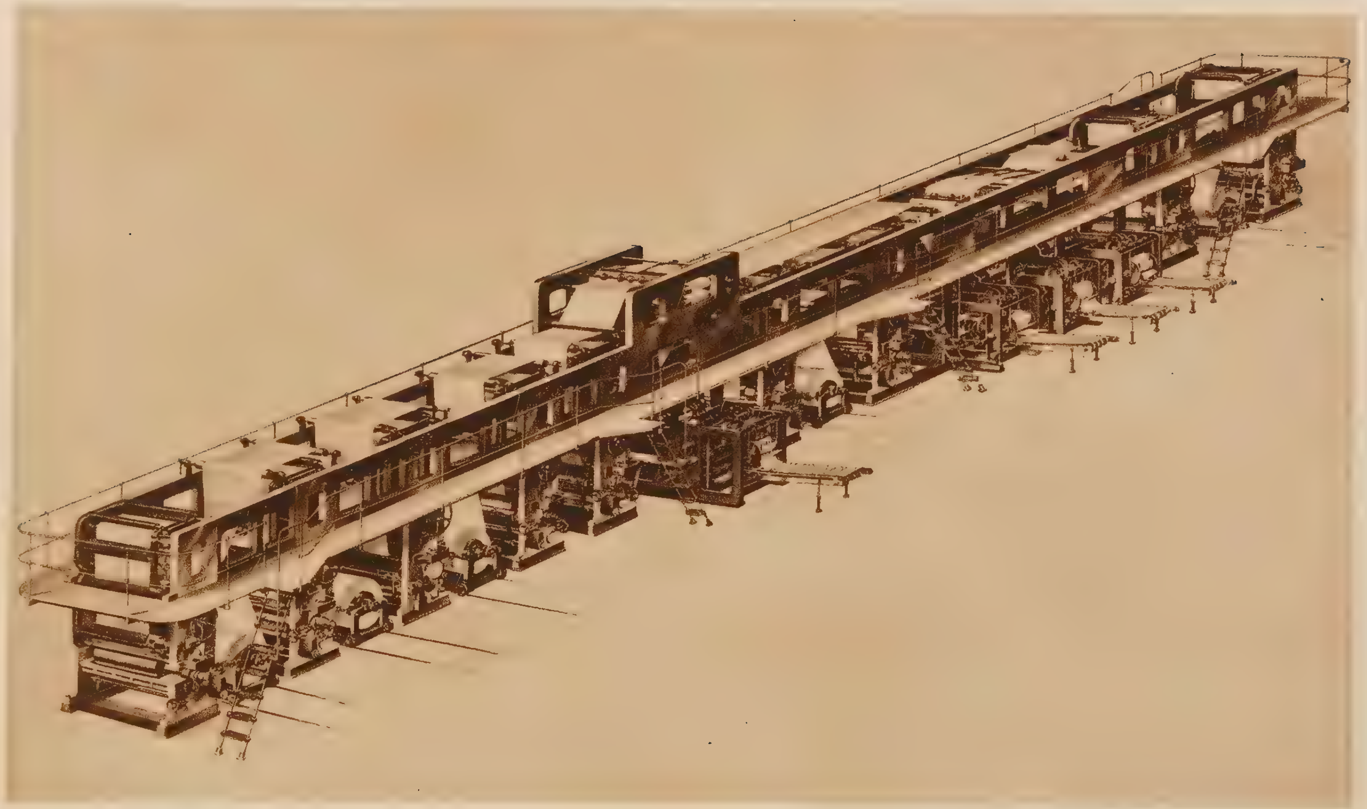
A rotary photogravure machine at the Sun Engraving Works, Watford. The paper is passing through the machine from the reel, between the impression and printing cylinders, to the drying apparatus.



A "Mann" two-colour and perfecting rotary offset machine with "Dexter" pile feeder. Cylinders and other moving parts built up of sheet steel giving lightness with great strength and requiring less power at higher speed are features of these machines.



A two-revolution Miehle press designed for high-class letterpress and colour printing. It is made by Linotype & Machinery, Ltd., England.



An "Albert" Multi-Colour Photogravure Rotary Press, with 9 Presses and 4 All-Size Folders. It was designed for a leading English firm of printers.

A good deal of high-class colour printing is done by selective inking of the copper plate, the colours being dabbed on by small tampons through stencils, or painted in with brushes. In the final wiping, the edges of the colouring are skilfully blended so as to give a homogeneous effect. Naturally such a process is very slow, and in the case of large plates not more than four or five prints may be produced in a day's work. As the price obtained is commensurate with the time expended on the work, this limited production is of little consequence.

Photogravure is a comparatively simple process, but to produce fine results it requires skilful craftsmanship. It has the advantage of requiring very inexpensive plant, in which a copperplate press is the most costly item.

The other photogravure process is that known as rotary photogravure. Both processes were originated by the late Karl Klietsch (whose name is often spelt Klic). His object in inventing rotary photogravure was to find a quicker method of printing than that with the flat plate on the hand-press, and he conceived the idea of etching the photogravure image on copper cylinders for printing in the way employed by textile and wall-paper printers, using a web of paper instead of separate sheets. The principal difference he made, relatively to the older process, was to introduce a cross-line into the image on the copper instead of using a grain to give an ink-holding capacity to the etched parts. This screen does not play any part in reproducing the tones of the picture, as in the half-tone process, but is merely for the purpose of forming cells which hold the ink against being dragged out of the larger hollows as it would be through the action of the wiping instrument, which is a steel scraper, technically known as "the doctor." This instrument rides on the surface of the cylinder and makes the surface perfectly clean. The paper follows the wiper, being impressed against the copper cylinder by a rubber-covered cylinder, and prints are reeled off at a high rate of speed.

The process was at first worked as a secret method by the Rembrandt Intaglio Printing Company, at Lancaster, starting about 1894, but gradually others working on what they conceived to be the same lines succeeded in producing equally good work, until now the process is practised extensively in all civilized countries. Numerous machines have been specially constructed for the printing, both from the web and from cut sheets. A recent development is the introduction of machines for printing from thin copper plates drawn round a cylinder, instead of using copper cylinders with a continuous surface. Though the latter are relatively heavy, cumbrous, and expensive, the new method has not so far commended itself to the older firms largely engaged in the work, chiefly because they have the machinery for handling the cylinders in the most expeditious and economical way. The idea appeals rather to the ordinary printer who may wish to do photogravure work as an adjunct to his existing business, and who intends to have the plates made by engraving houses which have laid themselves out for supplying the plates. So far the new method may be said to be on trial, and its advantages have not been fully proved, especially for large sheets.

One of the most important and interesting developments of rotary photogravure in the last three or four years is its application to colour work. The introduction of sheet-feed machines made this more easy of accomplishment than by means of the web rotary, though even in the latter case great strides have been made. One of the most recent attempts at web rotary colour printing is on a press installed by the Sun Engraving Company at Watford, which successfully prints three colours on both sides of the web. It is not to be expected that the highest class of colour photogravure will be produced by this means, but there are many purposes for which the product will be suitable—for example, illustrated store catalogues in colour and cheap periodicals.

A pioneer in this field of colour photogravure is M. Fréd. Thévoz, of the Sadag Company, operating in Switzerland and France on a large commercial scale. He has produced magnificent work, both of art and commercial quality, for several years past. His latest innovation is a "Tandem" press for multicolour printing, consisting of three or four elements linked together in such a way that the sheets fed automatically from a pile at one end of the machine are delivered at the other end in a pile, the inks being dry and the sheets ready to be taken away. Sheets up to 50in. by 36in. are printed. The work is of the highest class, perfectly registered, and uniformly good in colour, the speed attained being about 2,500 per hour. W. G.

CHAPTER IV

PHOTO-LITHOGRAPHY AND OFFSET PHOTO-LITHO

Some of the earliest experiments in the application of photography to printing were directed to the reproduction of line and tone originals on litho stones and on zinc or aluminium plates. A successful method, used for Ordnance maps and other varieties of line work, employed paper coated with bichromated gelatine. This was exposed under a line negative, inked with transfer ink, and "developed" by soaking in water and lightly sponging the surface. The ink adhered firmly to those parts of the gelatine that had been hardened by light action, but washed away from the unaltered parts. The resulting transfer was laid down on stone or metal, to be printed from in the usual way.

The process in general use at the present day may be outlined as follows: A thin litho zinc or aluminium plate is coated with bichromated albumen, exposed to light under a suitable negative, and then coated with ink and developed by washing away the unhardened albumen with water. The plate is then treated and printed from in the lithographic manner, but the design consists of an image in tanned albumen, firmly attached to the plate and having a great affinity for printing ink. Various substances which could be fixed by light action and then maintain an affinity for greasy ink, such as asphaltum, certain glues, natural and synthetic gums and resins, have been used for coating litho plates to form a printing surface.

Screen negatives are used for the reproduction of pictures, as in the half-tone process. The gradation of the reproduction cannot be altered easily on the litho plate, and the correct tonal relations must be obtained in the negative by good technique and retouching. The offset method of printing is essential to "lift" a perfect impression from the grained surface of the plate. The results given by photo-lithography in half-tone are distinguished by their softness, subtle gradation, and pleasing surface character, but they lack the crispness and brilliance given by half-tone relief blocks, and the rich, velvety shadow quality of photogravure.

Considerable progress has been made during the last few years in the development of apparatus for repeating the same design on the negative or on the litho plate in predetermined positions with the utmost precision, an essential condition in the production of stamps, bank-notes, and many varieties of commercial and colour work.

Photo-lithography is used extensively for colour printing. The technique employed by different firms varies considerably in detail, and no method can yet be regarded as standard. Several printings are frequently necessary to obtain sufficient strength of colour, so that the ordinary methods of tri-colour reproduction cannot be used in many cases. In addition to this, photo-lithography shares with photogravure the disadvantage that very little colour correction can be made on the printing plates themselves. This is a serious drawback, involving tonal corrections on the negatives or positives used in the production of the plates. These corrections require considerable judgment on the part of the retoucher, since he has no means of assessing the value of his work until the plates are proved in colour. In the event of the proof not being satisfactory, further alterations must be made on the negatives, from which fresh plates are printed. It is highly probable that methods will be developed for making colour corrections on a quantitative basis in the near future. These and other problems are being attacked vigorously in this country and abroad, and their successful solution will open up still wider fields for the use of photo-lithography.

With the object of producing photo-litho plates of greater durability and having greater depth of tone in the shadows, methods are being developed of etching the work into the plates. The resulting surface is intaglio in character, but the manner of printing is offset-lithographic in principle. Offset photo-litho is a particularly suitable process for all forms of reproduction on papers having a "natural" surface, which cannot be used normally for printing from half-tone blocks. For this reason the process is being more and more used for catalogues and for book illustration, as well as for the reproduction of pictures in colour.

The facilities available now for repeating designs on the plate have resulted in various kinds of commercial work, such as cheques, labels, and business headings, passing into the hands of the photo-lithographer. Another interesting development is the use of photo-lithography for newspaper printing. The results achieved in this direction have been remarkably successful, but it is obvious that the limitations of the process, such as the difficulty of duplication, the short life of the plates as compared with that of stereos, and the anxious care required in printing, render the method unsuitable for printing daily journals. On the other hand, the high quality of the results would seem to justify its extended use for the production of weekly provincial papers.

Certain methods of producing litho plates direct from a line copy have been put forward recently as new. They are, however, merely variations of the long-established reversal processes introduced by Vandyke and Tellkampf. Bichromated fish-glue or gum arabic is used to form a stencil after exposure and development. The design consists of the bared metal, to which litho transfer ink or bitumen solution is applied, after which the colloid film is removed. The work thus exists as a true lithographic image on the metal. A. H.

CHAPTER V

LITHOGRAPHIC PRINTING

The art of lithography dates from about 1800, when Senefelder made his historic discovery that the surface formed by writing or drawing with a greasy ink on a level slab of limestone had an affinity for printing ink, while the unaltered parts of the stone repelled the ink so long as they were kept damp. The ink image could be printed on paper by applying rolling or scraping pressure.

It was later found that many surfaces other than limestone might serve for printing in the lithographic manner. Sheets of zinc and aluminium are now extensively used in addition to the natural product of the Bavarian quarries.

The original method of printing on a hand-press was soon superseded by flat-bed machines, except for proving and for small editions. On these machines inking by the skilled craftsman is imitated by an elaborate system of rollers. Damping rollers take the place of sponge and damping cloth, and a large impression roller does the work of the scraper.

The advantages of this method of planographic printing are fairly obvious. Autograph letters and other matter can be written on stone or plate, or on transfer paper from which the work is transferred to the printing surface in the hand-press. Any design in black and white can be prepared similarly. If the surface of the stone be grained instead of being polished, it is possible to draw on it with "litho crayon" or "chalk" in much the same way that crayon is used on paper. This method allows the artist great freedom of expression, the technique is simple, and any desired number of impressions can be printed without the intervention of any photo-engraving process.

Lithography was much used formerly for the illustration of books and for the reproduction of pictures in monochrome or colour. Much less of this work has been done since the advent of the photo-engraving processes, but lithography is kept very much alive by the present-day demand for posters, show-cards, and similar productions.

Chromo-lithography demands not only skilled draughtsmanship, but a well-developed faculty for colour analysis on the part of the litho artist. An outline drawing is made on stone, defining all the areas of local colour in the original painting or sketch. Impressions are taken on paper from this "key" stone, and are dusted with a powdered dye and transferred to as many stones as there are colours to be printed. Aided by the dye outlines, the artist draws each stone for printing in its particular colour. The drawing technique may include a number of methods, such as stipple and line work with pen or brush, chalk work on grained stones, and the use of mechanical stipples.

Lithography entered on a new era when the introduction of zinc and aluminium plates made possible the development of the rotary machine, resulting in a greatly enhanced speed of production. A still more revolutionary improvement was realized in 1910, when offset printing was shown to have enormous advantages for work on paper. On the offset machine the print is taken first on a rubber-covered cylinder from which it is transferred to paper. The resilient character of the rubber makes it possible to "lift" the finest work from a grained plate, and in turn print it on paper either rough or smooth in surface. No great change has occurred in lithographic printing in recent years, but many improvements have been made on the mechanical side, and modern single and two colour rotary offset machines equipped with automatic feeders, deliveries, &c., are among the finest examples of printing engineering.

Ink makers have applied themselves successfully to the problems associated with offset printing in producing inks of great colour intensity, and a notable achievement has been the production in permanent inks of colours which were little used previously owing to their fugitive character.

From time to time much is heard of methods of "dry lithography," which it is claimed render the damping of the plate during printing unnecessary. The idea has had a limited success, and it has been found possible to print litho plates on letterpress machines in a few instances, but lithographers generally have still to be convinced of its advantages.

H. M. C.

CHAPTER VI

COLLOTYPE AND PANTONE

Collotype, the most direct of the photo-engraving processes, is based on simple principles. A reversed negative of the subject to be reproduced is used, and from it a print is made on a film of bichromated gelatine (usually prepared on a glass support) by exposure to daylight or to a suitable artificial light source. The gelatine is washed thoroughly and dried and is then allowed to absorb water. It is inked by passing over it a roller charged with a special lithographic printing ink. The exposed parts of the film have a selective affinity for ink which varies with the degree of hardening produced in the gelatine by light action. It is the water absorbed by the softer parts of the gelatine film that determines the amount of ink taken by the surface. The ink image is printed on paper by hand on a press of the type used for lithography, which process collotype resembles in many respects, or on a modified litho flat-bed machine.

Collotype impressions are practically free from grain, and reproduce fine detail with great accuracy. For this reason the process is much used for geological and other scientific illustrations. Worked under good conditions, with the necessary technical skill, the process gives beautiful results, in which subtle tones are reproduced with great fidelity, but without the rich shadow quality associated with hand-printed photogravure. These considerations, as well as the relatively low cost of the process for a limited number of copies, have led to its extensive use for reproductions in the form of wall pictures and for illustrations in *éditions de luxe*.

It is unlikely that collotype will ever compete with other processes of photo-engraving in the production of large editions printed at high speed. The number of copies that can be taken and the speed of printing are limited by the delicate character of the printing surface, while the whole process is subject to variations and failures due to the vagaries of the gelatine. Climatic conditions play an important part in this connexion, and have no doubt prevented a more extended use of the process in this country. Modern methods of air-conditioning, together with minor improvements in technique, have resulted in a more uniform standard of work and a larger scale of operations. Evidence of this is to be found in the numerous excellent collotype reproductions in colour that have been produced in the last few years.

The technical progress that has been made with collotype has been gradual and unobtrusive, and it must be admitted that the individual skill and experience of collotype workers are responsible more than anything else for the position held by the process at the present time.

H. M. C.

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The Pantone process, the invention of Mr. Ronald Trist, has attracted a great amount of interest since it was introduced to the printing trade about two years ago. The basic principle of the method is that a printing plate, bearing an image that is not in relief, can be made to repel ink in the bare parts of the plate by treating these parts with mercury (quicksilver), while the printing parts will take up ink. Such a plate, or forme of plates, can be printed on any machine that will give printing pressure, whether rotary or flat bed, and will yield many thousands of good prints on any kind of paper. These are two important points in favour of the process. It means that a letterpress printer can obtain on his ordinary presses results from even the finest line and half-tone work equivalent to, and in some respects better than, those by offset lithography on matt-surfaced papers.

The process of preparing the plates is very simple, and on the whole is quicker than the usual processes of photo-engraving. Steel coated with chromium is used for the plates, and this fact in itself implies a printing plate with very durable qualities. The plates cost rather more than ordinary process blocks, but it is claimed that the advantages gained through ease of printing and by the employment of cheaper papers compensate amply for the difference. It has been successfully demonstrated that the plates can be curved and put on the rotary machine for newspaper printing, and the results we have seen run off at a high speed on the web are better than those printed from stereoplates, because a finer screen can be used, and the type matter is much sharper and blacker.

Whether Pantone can ever displace the stereoplates in rotary newspaper work is an interesting speculation. It involves many considerations, and the problem can probably be solved only by making full-scale trials on a newspaper rotary machine.

W. G.

CHAPTER VII

THE RENCK SYSTEM

In the art of printing there has been a steady evolution both in quality and speed, and many new methods are being evolved and tried. Among them is an experimental process which is being tried in Wurzburg at the machinery works of Koenig and Bauer, and is the invention of Mr. Heinrich Renck. The system, as applied to the rotary newspaper press, consists of using brass shells of the size and shape of the ordinary stereoplates. The surface of the plates carries the image to be printed from nickel, while the surrounding brass surface is treated with an amalgam of mercury. Good results have been obtained from letterpress and fine screen illustrations, and the system is now being applied to colour printing. The points in favour of the system are said to be: no alteration to an existing printing press; speed of preparation of printing plates; cheapness—as all foundry work is eliminated—and accurate register for colour work.

Half-tone blocks of fine screen can be used as illustrations, or they can be produced by the Renck method. For example, a negative is made from the photograph or drawing, and a glue copy is made on sheet brass. For colour work the ordinary colour filters are used. The glue copy is then chemically treated in an amalgamating bath for a few seconds. It is estimated that only from twenty to sixty seconds are required for this process, as against twenty minutes for ordinary half-tone. Moreover, the brass sheets can be used many times.

The method of preparing a brass shell, or printing plate, ready for the press is as follows: The shell is accurately machined and polished on the outer curved surface and put in a nickelling bath, in which it takes a deposit of nickel, the thickness of which varies according to the length of run required. The plate is then placed on a plate cylinder of a transfer press, which is similar to an ordinary stereo mangle, the cylinder of which is covered with sheet rubber, but having an additional plate cylinder above.

The forme containing type matter, illustrations, &c., is placed on the bed of the machine, rolled up with transfer ink, which on moving the machine is transferred to the rubber-covered roller and from there to the brass shell held above it. The shell is then asphalted, cleaned with talcum, and placed in a muffle furnace for about half a minute to melt the asphalt and make it adhere to the surface which has to print. All grease is then removed from the surface, and the shell is put into a de-nickelling bath to clean back to the brass all nickel not isolated by the asphalt. The plate is then placed in an amalgamating bath, which coats the brass, enabling this to refuse ink, while the printing surface takes it up. The plate is now ready for the press.

The whole process, from the time the forme is placed on the transfer press until the plate is ready for printing, takes about three minutes for the first and half a minute for each succeeding plate. Ordinary rotary letterpress ink is used, and it is necessary to spray the inking roller with mercury to build up the resist to the ink which was created by metallizing the surface of the plate. The spray is intermittent and can be done mechanically, or the mercury may be mixed with the ink. The amount of mercury used is so small that no ill effects can accrue to the operator. After printing, the plates are cleaned, de-nickelled, and polished ready for re-nickelling. Ordinary packing can be used for the impression cylinders. The quality of the printing is not affected by the paper used, and the high speed of printing is maintained.

Whether this process will ever displace printing by stereo is a problem which only the future can solve, but the tendency seems to be that, if the present experiments carried out with regard to colour are successful, the system will be applied to rotary presses for the production of illustrations either in black or in colour.

One of the necessities, of course, is the production of suitable inks for colour printing, and some time must elapse before the practical possibilities of the system are known.

CHAPTER VIII

ENGRAVING ON WOOD, COPPER AND STEEL

Woodcut is the earliest form of engraving for making prints on paper practised in Europe. It is a process in which blocks made from the plank of the wood (*i.e.*, sawn across the grain) are cut with a knife to remove the parts which are to print white, leaving the black lines or spaces in relief. For the first half of the fifteenth century it was a most popular form of multiplying pictures of saints and other religious subjects, which hitherto had only been available to those who could afford a painting or illumination.

Early in its history the art was turned to the service of making books. In fact, the earliest type of printed book in Europe is the block-book, in which both picture and text are printed from wood blocks. There is no definite clue to the date of any block-book before 1467, but the balance of evidence is in favour of placing some of them one or two decades before the introduction of printing from movable type. Of this earlier group the Apocalypse is the most beautiful, and of the later group, probably dating nearer 1460, the Netherlandish Biblia Pauperum (a picture Bible, and harmony of the Scriptures for the poor clergy) was the most popular.

With the advent of the printed book woodcutters were soon employed to provide illustrations and decorative embellishments. At no period have printers taken a greater pride in their work than in these wonderful years after the new discovery, and never has the combination of woodcut and printing from type achieved more perfect results than in the second half of the fifteenth century. These achievements are equally great whether we care for the black-letter and powerful cuts of the presses of Ulm and Augsburg, or the lighter Roman types and the finer cuts produced in Venice. There may be more formal beauty in the Italian productions, but in the making of a harmonious page the Gothic craftsmen were no whit less able.

Woodcut is printed from the surface like type, so that it forms a natural partnership with book printing, and the ink being taken from the surface has the right strength to combine with letterpress. The chief dangers are met when the woodcutter leaves spaces of black which overbalance the weight of the type. The greatest achievements of woodcut may be prints which have been made for separate printing, such as the majority of Dürer's woodcuts, but speaking generally the needs and limitations of book illustration have been the guiding factors in the development of the art.

With the development of the craft during the fifteenth century an outline method gradually yielded to a more complete system of outline and shading, which left the art independent of the illuminator. During the sixteenth century more elaborate systems developed, sometimes more fitted in style to engraving on copper. The art lost the freshness of the earlier period, and the greater artists turned more often to etching and line-engraving, which became the more popular modes of making prints during the seventeenth and eighteenth centuries, even for the illustration of books.

In cutting blocks designed in black line the cutter's work would chiefly be the mechanical labour of removing the negative part of the design. The craft of cutting could only attain a higher place in artistic production if the lines to be cut corresponded more positively with the artist's drawing. This is the case with a white line cut—*i.e.*, a cut in which the positive lines of the design are white on black. It is found to some extent in the fifteenth-century work, but it does not take a large place in the history of the craft until the introduction of the use of boxwood cut across the grain, when the knife yielded to the graver and wood-engraving proper may be said to begin. This is generally attributed to Thomas Bewick in the latter half of the eighteenth century, but the real truth is that he was the first influential exponent of a method of which examples could be quoted much earlier in the same century. Even in this phase white line is generally subsidiary to a black design in which tones are helped out by the admixture of white line.

From the time of Bewick there have been three definite periods of interest in English wood-engraving. First the illustrators of the sixties, notable for faithful engravers such as the brothers Dalziel, working sometimes in facsimile, at others in their own convention after drawings by Rossetti, Millais, Sandys, and others; then the remarkable revival of fifteenth-century ideals of book decoration by William Morris in the books of the Kelmscott Press, followed soon after by such fine productions as the Vale and Eragny books; and finally the vital accomplishment of many artists of the last twenty years who have turned to wood-engraving for their original expression, several of whose works are here illustrated. In variety and novelty of technique the French school has perhaps supplied the leading spirits, but British artists have produced, as in etching, an equally convincing achievement.

Now that drawings can be reproduced so expeditiously by photo-mechanical processes, many illustrators have been content with the facsimile supplied by line-blocks or collotype. But it is to be hoped that publishers will continue to realize the added distinction in line that engraving or cutting implies, even when the original block is replaced by an electrotype, and will encourage a form of illustration that can prove its quality whether called upon for designs in a market gardener's circular or for illustrations to a finely produced book.

A. M. H.

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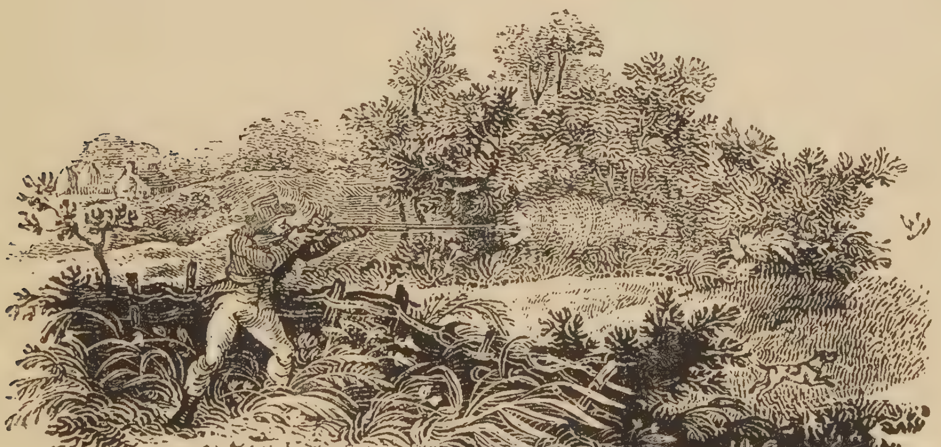
Copperplate engraving was never more popular than it was in the nineteenth century for book illustration or for copying famous pictures, especially those in the Royal Academy exhibitions. Copperplate engraving of the pictorial style had practically ceased before the beginning of this century. After having a rival in lithography it was superseded towards the end of the nineteenth century by etching as the popular process for reproducing pictures, while photographic processes were also adopted and served their purpose in a popular, if less artistic, way. Line engraving has recently (since about 1920) been revived by many artists of the younger generation, both in France and England, as a medium for producing original prints. That which still exists of the old-fashioned, commercial copperplate engraving is of a business character for visiting cards, trade cards, letter and invoice headings, fine animal pictures and diagrams, anatomical and surgical subjects, charts, maps, and bank-notes, cheques and postage stamps. It is probable that some of these purposes may be displaced by photographic methods, as in the case of the Ordnance Survey maps, which for seventy years were engraved on and printed from copper plates. They were so well done that at most exhibitions, at home and abroad, they received the highest awards. This past practice is entirely changed. Many of the old plates are still being printed from, or transfers are taken and transferred on to zinc plates to be printed either by flat-bed or offset machines. This process, however, will only continue until new surveys are completed. An entirely new method is already in operation for the new popular edition of Scotland, in which the survey is drawn upon paper to a large scale and then reduced by photography, from which the work is printed upon sensitized zinc, and the edition is printed by lithographic machines. Maps already produced by this method are equal to, if not better than, the engraved ones of former days.

It is well known that copperplate engravings suffered in the printing process, and about 1820 engravers took to using steel plates, which were better able to resist wear. Otherwise there is no difference between copper and steel plate engraving. This drawback to copper was met years ago by putting a steel facing on the copper. A later improvement was plating with chromium or by the "Cormil" process, thus rendering the plate capable of long use and of resisting the effect of certain printing inks. A great stimulus was given to copperplate engraving in 1901 by the introduction of a machine to print from deeply engraved plates at over 1,000 copies an hour. Much improved machines for this purpose are now on the market.



A tail-piece engraved on wood by Thomas Bewick.

CHAPTER IX

ETCHING, MEZZOTINT, AND AQUATINT

Etching is derived from the practice of late medieval armourers, who produced ornamental designs on plates of iron by the use of acid. Iron was the metal first used by engravers when they adopted this method as an alternative to engraving with the burin for producing prints. Iron plates such as those used by Dürer about 1515-18 were liable to rust; it was not long before copper was substituted. In the early days of etching, as at the present time, a soft grounding was used to cover a clean copper plate, through which the etcher "scratched" the drawing and gave it a first etch in acid. Those parts which were sufficiently etched were covered up by a resinous varnish.

In later times the treatment of an etching surface varies with different etchers. The plate may be etched a second time, or more lines may be scratched before the second biting. After a series of such operations the whole plate may be cleaned and a preliminary proof taken. If necessary the ground may be put on again and additional scratches made. The artist is not limited as to the number of lines, or the number of times the etching is treated. It is a frequent practice to supplement and enrich the etched lines by the addition of dry-point, in which the copper plate is directly attacked by a pointed instrument and is not subjected to an acid bath. The printing from such a plate is in itself an artistic operation, quite different from copperplate printing. Etched lines have an amount of roughness and will hold the ink. The printer wipes the ink off in very variable amounts so that masses and tints of ink are left by and among the etched lines to produce different degrees of shade. There has lately, however, been a reaction in favour of wiping the plate clean.

Some of the works of the great etchers are considered as masterpieces and realize very high prices. The value of these works is high, first on account of the merit of the work, and secondly because of the limited number of perfect impressions which can be taken before the fine lines on the plate are worn away.

Unlike most other methods of engraving, it is practically impossible to copy an etching by any photographic method by which an unlimited edition may be made. There is, however, the possibility that a very near approach to an almost perfect copy may yet be achieved by machine photogravure.

◆

The art of mezzotint engraving is usually considered to be the most difficult method of reproducing pictorial subjects. At one time it was almost exclusively used by artists for portraiture. As its name implies, it is a method of obtaining "middle" or intermediate shades. In surveying the methods used for making wood-engravings and copperplate engravings it is apparent that to obtain shades there was no alternative but to cut the lines or dots individually and in varying breadth, or fine lines much closer to one another. Even in etching there was no certainty of obtaining a large number of prints of equal "colour value." Whether this had any influence upon Ludwig von Siegen in 1642, when he devised mezzotint engraving, it is difficult to say, yet there is no reason why it should not have been so. The certainty of producing middle tones of about the same strength practically in all the copies taken was a distinct advance. But preparing the plate is a tedious process, and a high degree of artistic skill is required to obtain the picture. There can be no better way—other than personal instruction—of learning the principles of this art than to inspect the exhibits at the Victoria and Albert Museum. These exhibits are the rocker, mezzotint knife, scraper, burnisher, and roulette. By studying the successive stages of the plates it will be gathered that a clean copperplate is indented so many times and in so many directions that when an impression is taken in ink it is solid black all over the paper. This, then, is the basis upon which the artist, working from dark to light, produces the picture by the burnisher, scraping and cutting away until the picture is completed. It is easy to conceive that a machine could be devised for producing the grounding, and it has frequently been produced by rolling glasspaper on the plate under heavy pressure, but only the artist can make the picture by his own treatment of the ground.

The golden age of the mezzotint was the eighteenth century, when this process excelled all others in popularity for the interpretation of Reynolds and his contemporaries. It was also employed with considerable success at Vienna. The finest proofs of the old mezzotints are always those in black, the so-called "colour prints" being in many cases printed from the worn plates and worked up with pigments applied by hand.

In the present day there are mezzotints truly printed in colour, and as examples may be mentioned "The Harvest Dinner," by F. Wheatley, R.A., mezzotint by L. Busière, and "The Rabbit Seller" and "The Village Festival," by Wm. Shayer, sen., mezzotint and colouring by Eugene Tily. The engravings of H. Macbeth-Raeburn, A.R.A., after Raeburn, are unsurpassed among modern colour prints in this process.

There are many subjects engraved ("scraped") in black only by Norman Hirst after nearly all the great painters, of which may be mentioned "The Godsell Children" and "The Rutland Children." "Pinkie," by Scott Bridgewater, after Lawrence, is another noteworthy modern mezzotint. Sir Frank Short, R.A., who has engraved many fine plates after Watts and other painters, has also used mezzotint largely for original work, and has trained many others in the skilful use of this process, in which English engravers have always excelled.

◆

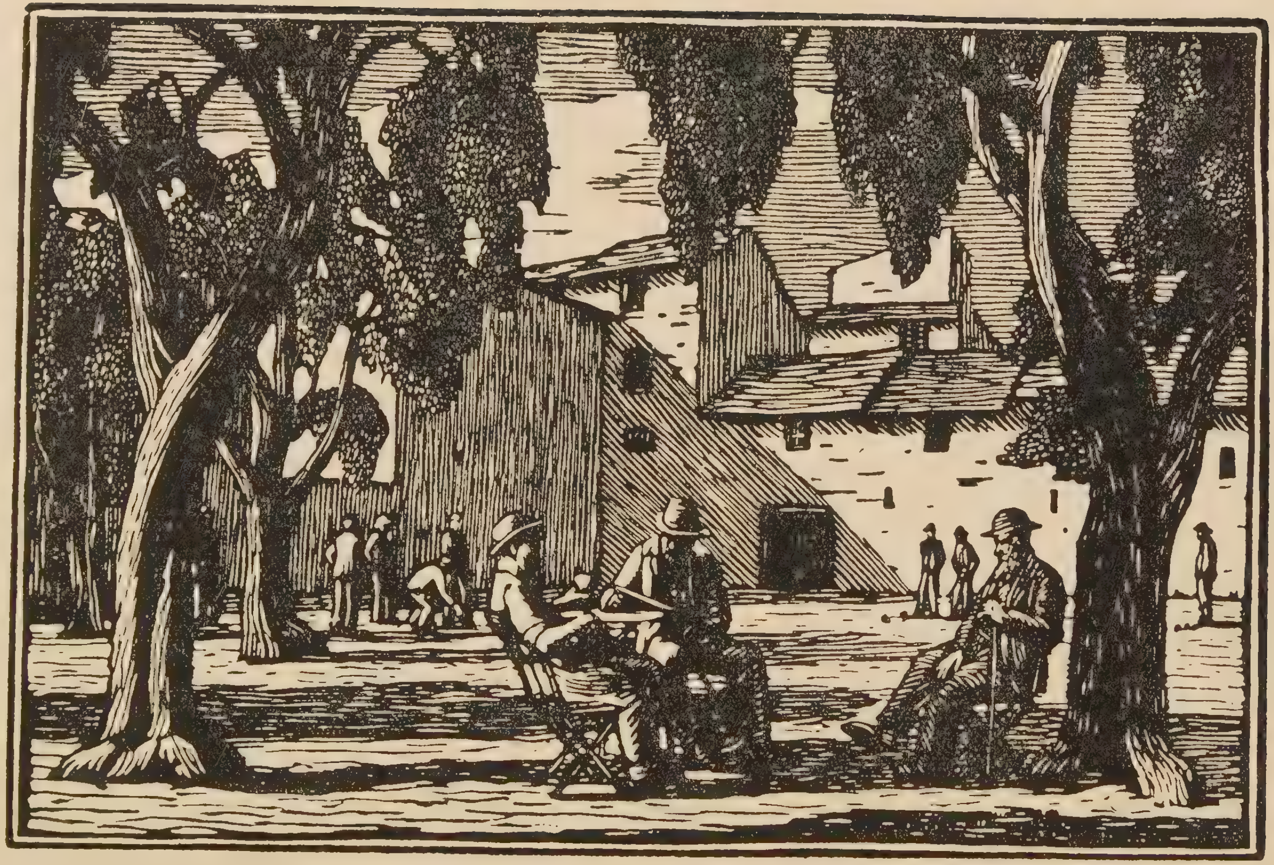
The aquatint method of engraving was the last of the great series of processes by which copper plates are manipulated. It was introduced almost a century after mezzotint, and was the invention of the Abbé St. Non in 1750. Shortly afterwards the treatment was improved by Jean Baptiste le Prince. Its introduction into England is commonly ascribed to Paul Sandby, but it has recently been proved that the less known engraver P. P. Burdett had used it earlier than Sandby. Since the topographical and sporting prints of the early nineteenth century aquatint has been little used; but in recent years it has been revived again as a medium for original engraving, chiefly through the influence of Sir Frank Short, R.A.

The term aquatint does not imply that the process involves the use of water, but rather that the prints produced bear a resemblance to Indian ink or sepia drawings. It is a comparatively easy process in the hands of an artist, as the "grounding" can be laid without much trouble to suit the picture desired. At the present time the grounding is laid in a dusting-box, as for photogravure; but in the eighteenth and early nineteenth centuries it was laid in a much more rudimentary manner, thus accounting for the large grain frequently met with in the early work. The method adopted was to shake a powdered resin tied up in a silk bag so that the dust fell on a copper plate, and when the plate was covered it was held over a torch of paper or tapers to melt it sufficiently to make it adhere. In the early part of the nineteenth century a variation was introduced in which the resin was dissolved in spirit and flowed over the plate. The plate could either be left quite horizontal until the spirit evaporated, leaving the resin adhering to the plate, or it might be tilted before it was dry, so that more resin would run down towards one edge. The first spirit method gave an even tint, and the tilting method gave a graduated tint. This gradation can be seen in many prints. When the plate was cool after the resin method, or dry after the spirit method, it was etched with weak nitric acid—later perchloride of iron was used—thus etching the plate to obtain a slight ground all over. Upon this ground the subject was traced and very lightly scratched on the plate as a guide for subsequent etchings. The picture was gradually evolved by a succession of stoppings out with a resinous liquid, and etching after each stopping out. For "finishing" the picture the very finest linework and heavy solids were drawn with a paint of whiting and sugar, and allowed to dry. When dry, the whole surface was covered with a resinous liquid (spirit varnish or brunswick black), and when that had dried the plate was etched for any desired time to get depth. The principle was that the acid would get through the varnish, attack the whiting, decompose it and liberate carbon dioxide gas, which would "burst" the varnish and allow the acid to bite the plate. Some aquatinters have used the copperplate engraver's burin or graver to cut all the fine work and solids on the plate.

After aquatint had become well understood it was mixed with other forms of engraving, just as some copperplate engravers had mixed line, stipple, and grain engraving. As an example of mixed mezzotint and aquatint may be mentioned "William Adams, Esq.," by Charles Turner, A.R.A. (1773-1857).

Many aquatints have been produced by the partial use of coloured inks, generally a grey or brown for the earth and a blue for the sky of a landscape, the other colours being painted on subsequently. The beautiful French colour-printed aquatints of Janinet and Debucourt were produced by a much more elaborate process of printing from several plates. A similar process has been used by the young English engraver Kenneth Hobson in his colour-printed aquatints after Turner.

A novel application of aquatint was made by the wood-engraver Baxter, the producer of the highly valued Baxter prints. When he adopted metal for some of his blocks he used aquatint in many of them for producing tints, with the difference that he etched into relief, instead of intaglio, by reversing the order of stopping out and etching. Others have followed on the same lines, and photogravure has generally been executed by using the aquatinter's method of dusting the plate with an acid resist before applying the carbon tissue.



"Jeu de Boules, Vence."—From the woodcut by Mrs. Raverat, one of many artists who, in the last twenty years, have turned to wood-engraving for their original expression.

CHAPTER X

HALF-TONES FOR NEWSPAPERS
ROTARY PRESS PRINTING

Great progress has been made in recent years in the illustrating of daily and weekly newspapers by the half-tone process. The general excellence of these illustrations, considering the difficulty of printing them on the rotary press, is remarkable. It is not so long ago that the experiment of inserting half-tones in the daily Press was viewed with dread by the stereotypers and printers, and the attempt more often than not turned out an unpresentable smudge which was held up to derision by the newspaper reader. The photo-engraver was usually blamed for the result, and he in turn blamed the printer and stereotyper.

Gradually it came to be recognized that some alteration in the methods of stereotyping and printing was necessary. The flong for making the matrices was improved by giving it a better facing, and the methods of impressing it were altered, the old system of using the mangle and the beating brush being either supplemented or superseded by presses with direct and powerful platen pressure under steam or electric heat. Later the old-fashioned wet flong, consisting of alternate layers of blotting-paper, tissue, and paste, gave place to dry flong specially made by the paper-maker in the form of a soft pulp board. This in itself was a great improvement, and its use is the universal practice to-day. It was also recognized that some form of "make-ready" was required, and as it was impossible to do this on the numerous cylinders of the rotary press, a system of underlaying the plate before stereotyping was adopted. This consists in making a cut-out underlay from several proofs of the plate—in much the same manner as in cutting an overlay for flat-bed presses—the high-lights being cut away, the half-tones left to provide a double thickness, and the shadows securing a treble thickness in the case of a three-layer underlay; but in some cases five thicknesses are used, the cut-out openings being feather-edged to get gradation. The cut-outs are pasted together, and then pasted to the back of the plate in register with the picture on its face. Finally, the plate is attached to a solid metal block to bring it to rather more than type height, and the block is made up in the type forme, which is then run through the mangle, when the pressure causes the underlay to raise the shadows and half-tones into relief. This process is called "bumping-up." When the matrix is made and cast a similar relief is imparted to each of the stereoplates, so that each plate carries its own "make-ready," and all are absolutely identical.

If such plates were printed on the flat-bed press with a hard-packed cylinder the high-light dots would probably not be printed at all; but with the comparatively soft blanket impression of the rotary press quite a satisfactory result is obtained. With the improvement in stereotyping and printing it was possible to use finer screens, such as sixty or sixty-five lines per inch, which enabled the photo-engraver to get more detail in the negatives and, by more careful etching, with the aid of etching machines, to obtain deeper plates, with more smoothly shouldered dots, which was helpful both to the stereotyper and the printer. Troubles due to set-off have also been overcome by the co-operation of the press-builders. The modern presses are in other respects also more suited to printing half-tone illustrations, particularly through improvements in ink adjustment.

Another reason for the marked improvement in newspaper illustrations of late years is the vastly better quality of the originals provided by the Press photographers, who make it easy for the photo-engraver to obtain first-class half-tones with little or no re-touching or "fine-etching." This has speeded up the work, so that in case of a special rush to get topical illustrations into the papers it is possible to turn out a half-tone within half an hour.

It hardly seems possible that the half-tone process can be further improved for rotary newspaper printing, so long as the plates have to be stereotyped and printed at the present high rate of speed.

W. G.

CHAPTER XI

ROTAGRAVURE PRINTING

NEWSPAPER SUPPLEMENTS

About the year 1912 rotagravure was hailed as the coming process, which was to supersede all other methods of producing illustrated newspapers, and it was taken up with enthusiasm on the Continent and in the United States, but somewhat less so in this country. Certainly newspaper proprietors here keenly investigated the possibilities of the process, but in most cases they were not convinced. A few of the more enterprising ordered presses, which in several cases were never used, and in others only for experimental runs.

A notable exception was *The Times Weekly Edition*, which for a long time was produced by this process, and contained some of the best results ever obtained in newspaper illustration; but the method was found too costly and was eventually superseded by the half-tone process. The *Southend Standard*, which started in 1914 to print a single page or an occasional two pages on a rotagravure machine running in tandem with the stereo rotary, is the only English newspaper that has remained faithful to this process down to the present day. In Australia an attempt to start a newspaper wholly printed by rotagravure proved a failure after a few numbers, but in South Africa the *Cape Times* with its weekly supplement has been a complete success, and to-day is showing extremely fine work. For weekly periodicals and magazines issued in London rotagravure has had much greater success than for newspapers, and is, if anything, growing in favour. The *Illustrated London News* in particular, which was the pioneer in adopting rotagravure printing, is doing wonderfully good work, and has latterly adopted three-colour rotagravure with successful results. In practically every important capital city in the world rotagravure-printed newspapers will be found. In Japan the process is largely used, and even China has adopted it. In Canada there are several rotagravure-printed newspapers, two being in colours. In South America, particularly in

Buenos Aires, there are several papers printed in this way, one being in colours. Throughout Europe there are many papers wholly printed by rotagravure, notably in Germany.

But to see the most extensive and intensive use of rotagravure one must look to the United States, where a newspaper is not considered up to date unless it has its weekly rotagravure supplement. The larger newspapers in the most important cities have their own plant, but the smaller newspapers are content to take their supplements from syndicates operating in New York and Chicago, producing seventy-seven localized supplements every week, the aggregate circulation of which may be judged by a statement that four of these newspapers use 3,405,000 supplements weekly. The *New York Times*, which possesses undoubtedly the finest rotagravure newspaper plant in the world, has for many years led the way with the quality of its weekly supplements, in the printing of which a score of presses are running day and night the week through. The *New York World* and the *Chicago Tribune* have been issuing supplements in colours for several years, showing a gradually improving quality.

The future of rotagravure printing for newspapers is still in doubt. The difficulty of the problem is that the speed of printing is much less than by the stereo rotary, and there is no rapid means of duplicating the cylinders to secure a larger output. If the rotagravure supplement is printed separately, as in America, there is no mechanical means at present available of inserting the supplements into the ordinary newspaper, and the newsagents in this country will not accept the supplements separately.

The more likely way of dealing with the supplement is to print it separately at a suitable speed for rotagravure, re-reel the product, and afterwards run the reel into the stereo rotary, so that the web runs into the folder at the same time as the webs of the text pages. Another way is to connect up the rotagravure machine in tandem with the stereo rotary, but this would inevitably slow down the regular newspaper printing to the output of the rotagravure unit. A recent improvement is the use of aluminium cores, with a plating of copper, for the printing cylinders, first introduced by the M.A.N. Company. In the case of 72in. cylinders used on Hoe rotagravure presses this has reduced the weight from 18cwt. for cast iron to 8cwt. for aluminium. Messrs. Hoe have been able to attain a speed of 9,000 cylinder revolutions on their rotagravure presses, and printing two-up this gives 18,000 copies an hour.

W. G.

CHAPTER XII

PHOTO-TELEGRAPHY

RECENT TECHNICAL DEVELOPMENT

It is a remarkable fact that, although the broad principles of picture transmission have been understood for many years, their application in successful commercial practice is a comparatively recent development. Recent progress has been very largely due to the technical development of certain accessories required in picture transmission rather than to the invention of completely new systems. Reduced to its simplest terms, the problem of transmitting pictures over a telephone line is still a threefold one, for three distinct elements are required. In the first place, it is necessary to have some means for translating the light and shade of the picture into corresponding variations of an electric current. A telephone line capable of transmitting without distortion these current changes to a distant point is the second element, while the third is a device for the receiving end whereby the transmitted current variations are retranslated into the light and shade of the original picture.

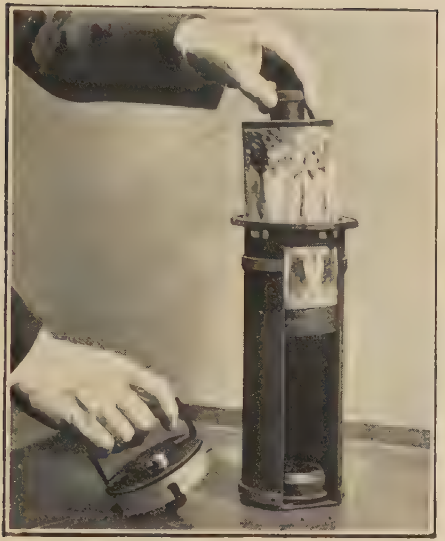
Any picture may be regarded as an assembly of very small elements, each of approximately uniform brightness and requiring a separate electrical "message" for its transmission. The larger the number of elements into which the picture is divided the more closely, of course, does the received picture resemble the original one, but the longer is the time required for the electrical "messages," which constitute the transmission, to be received. As an illustrative example it may be mentioned that for a picture 5in. by 4in. about 32,000 elements would be an average number, and to send the 32,000 separate messages for these would take about three minutes.

For transmission the film or picture to be sent is usually bent in the form of a cylinder which rotates uniformly and, at the same time, moves slowly in the direction of its axis. A small spot of light thrown on to the cylinder may thus be caused to traverse or "scan" the whole of the picture in a spiral path. The light, which is either reflected from or transmitted through the particular element which is illuminated, is allowed to activate a photo-electric cell, which practically instantaneously translates the light variations into corresponding electrical variations which are transmitted to the receiving station along a telephone circuit. In practice it is found far more advantageous to send the electrical signals as the modulation of a low-frequency alternating carrier current than as a simple direct pulsating current. If the transmission takes place by wireless the signals are caused to modulate the radio-frequency energy in the usual way.

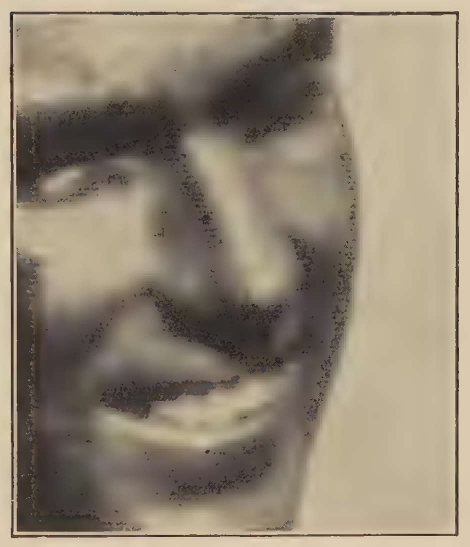
At the receiving end the varying modulation of the transmitted carrier current is used to reproduce the picture. The device used for retranslating the electric current variations back into the corresponding light variations is different in the various systems, but in most cases the light and shade is reproduced on a photographic film bent into cylindrical form which rotates in exact synchronism with the original film at the transmitting end. It will be realized that exact synchronism and phasing must be maintained between the transmitting and receiving cylinders if the received picture is not to be skewed or distorted with respect to the original.

In the system of photo-telegraphy developed by the Bell Telephone Laboratories, which has been in operation over the lines of the American Telephone and Telegraph Company for some time now, the retranslation of the electrical signals into light variations is accomplished by means of a "light valve." The electrical currents pass through a narrow metal ribbon situated in a strong magnetic field. As the ribbon moves in response to the electrical signals it acts as a shutter to a strong source of light, and lets through on to the photographic film varying amounts of light in the proportions of the lights and shades of the original picture. The maintenance of synchronism is carried out by means of an electrically operated tuning-fork at the transmitting end, which sends out impulses which control the motion of the cylinder at the receiving end. The picture "messages" and the synchronizing signals travel simultaneously over the same line.

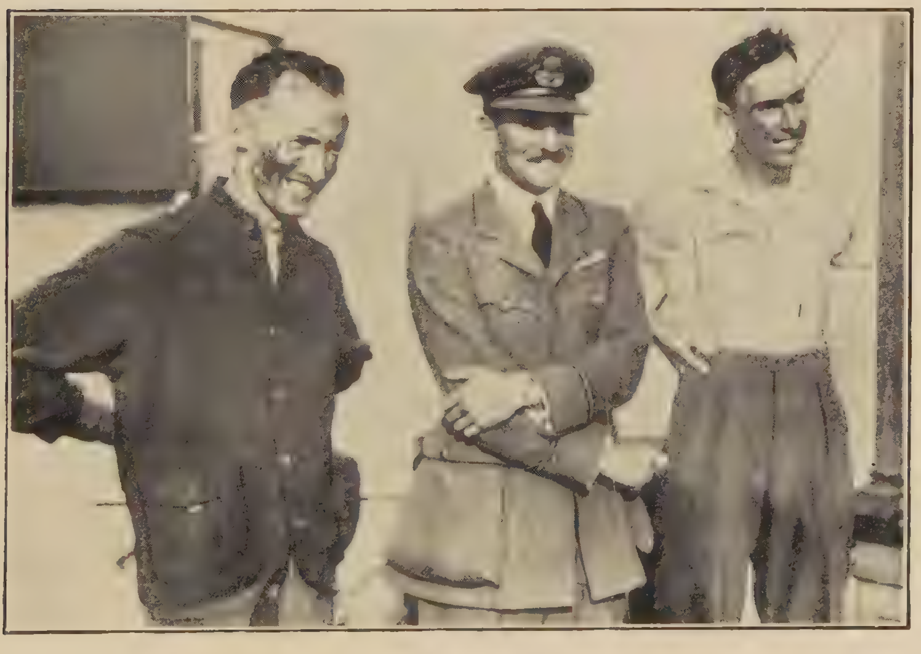
In the Siemens-Karolus system, which is extensively used on the Continent and in this country, cylinders are also used at both the transmitting and receiving ends, but the synchronism is carried out by having two exactly similar tuning-forks, one at each station. By careful adjustment of the temperature of these forks it is found possible to keep them in exact synchronism running freely without the aid of a separate



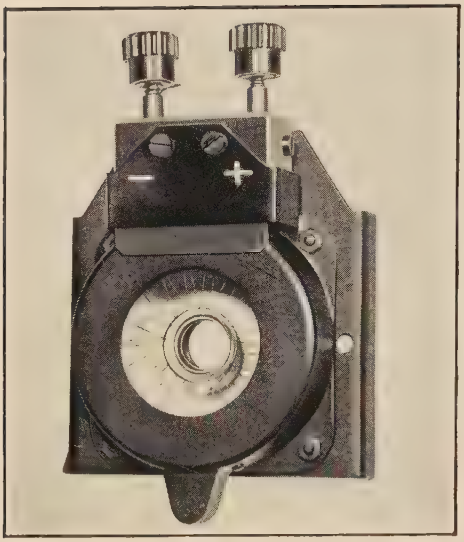
Placing a photograph, wrapped round a drum, in the transmitting cylinder.



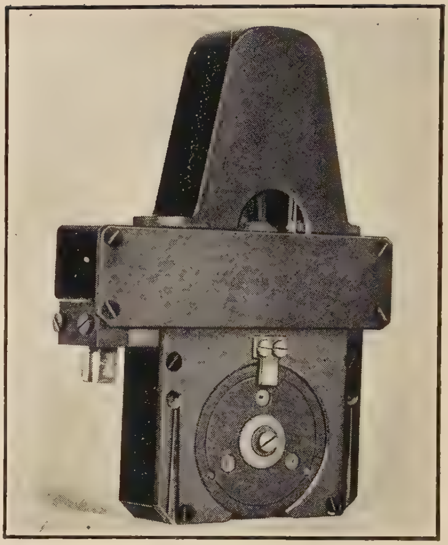
An enlarged section taken from the photograph below, showing how the lines of varying tone build up the picture.



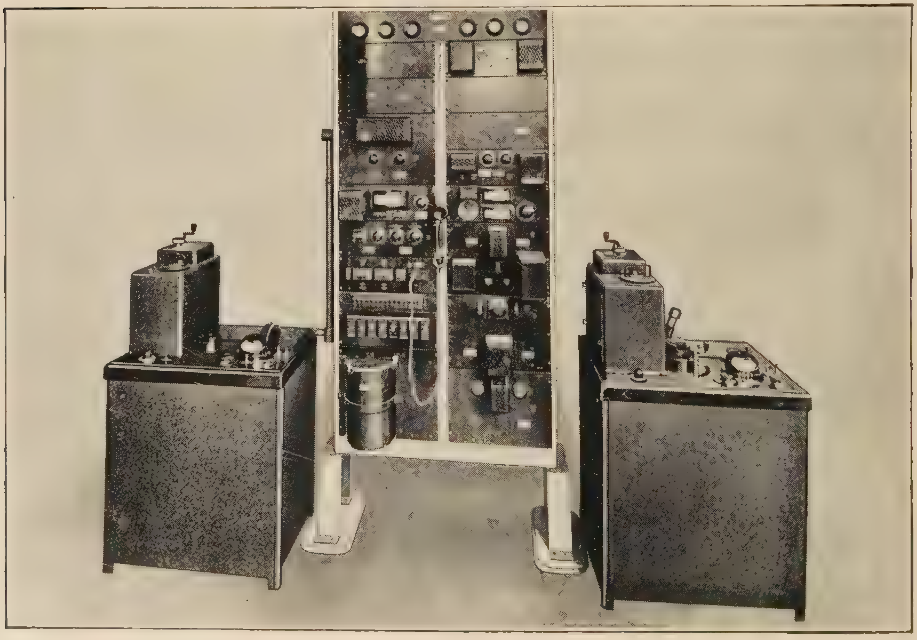
A photograph of the British Schneider Trophy pilots, after transmission by the Siemens process.



The photo-electric cell which converts the tone values of the rotating pictures into varying electric current.



The Kerr cell, which is operated by the received energy and controls the light which builds up the picture.



Above we show some of the apparatus of the Siemens-Karolus-Telefunken system: (left to right) the transmitter, the control panels, and the receiver.

synchronizing signal. Moreover, there is no need to prepare a special photographic film at the sending end; the picture itself is fixed to the transmitter cylinder. At the receiving end a combination of a Kerr cell and two Nicol prisms is used. The effect of the received electrical signals on the light, which is made to traverse the Kerr cell, is to rotate the plane of polarization by varying amounts so that there is a control of the light which ultimately passes through the prisms. Adjustments are made by means of the prisms so that when no signal is received no light passes, and that with maximum signal the greatest amount of light passes. The cell, therefore, acts as an "electrical shutter" controlling the light falling on the receiver cylinder.

The speed with which pictures can be transmitted depends on the electrical qualities of the telephone line. There are such things as "electrically nimble" and "electrically sluggish" telephone lines. An overhead line is an example of the former, while an underground cable is an example of the latter. Fortunately, however, for the development of photo-telegraphy the tendency in modern telephone practice is towards the laying of what are known as lightly loaded cable circuits, which are specially suited for picture transmission by wire.

In conclusion, it should be noted that, although photo-telegraphy is not quite as difficult a problem as the transmission of photographs by wireless, where difficulties due to fading, atmospherics, and multiple signals are encountered, there are times of geophysical electrical activity when earth currents and spurious signals are received, causing corresponding spurious effects on the transmitted pictures.

E. V. A.

PART V
COLOUR PRINTING

CHAPTER I
SURVEY OF RECENT PROGRESS
SOME NOTABLE INVENTIONS

The principle of colour photography upon which all modern colour processes depend is based on the discovery by Clerk Maxwell in 1861 that any colour, including white, can be imitated by the mixture in suitable proportions of red, green and blue light. These are known as the primary light colours. The commonest method employed by photographers for dissecting photographically the colours in the original subject is to make three separate negatives, each of them with the necessary colour filter and, of course, with three separate exposures. In the early years of the present century two Frenchmen named Lumière placed upon the market a photographic plate known as the Autochrome, on which an image may be obtained in natural colours at one exposure. The surface of the plate consists of an irregular formation of starch grains dyed in the three light primary colours. On the top of these coloured grains there is coated a sensitive panchromatic emulsion. During exposure—which is made with the glass side to the lens—the rays of light first pass through the coloured grains before reaching the sensitive emulsion. On development a negative image is first obtained, and finally by a reversing operation a positive image in the brilliant colours of the original. The autochrome, therefore, serves the purpose of a sensitive plate in combination with light filters and a viewing screen. The blockmaker has put the autochrome to two uses. In the first place it is used frequently as a colour guide when the colour subject is not easily accessible for proofing purposes. In the second place the autochrome has been used very successfully, especially for taking photographs in colour with a single exposure. In this case the blockmaker uses the autochrome as an original subject. By means of transmitted light and three separate exposures with three separate colour filters he proceeds on the same lines as he would by direct photography. Other screen plates of this type have been invented, notably a German invention put on the market under the name of the Agfa plate.

Much earlier than either of these inventions, Dr. J. H. Smith, of Zurich, gave a demonstration to the Royal Photographic Society of his patent film, in which three colour filters, plus the emulsion, were cemented together in one unit for exposure. They were separated in the dark room and developed to their respective colour records. Since the period of Smith's work, dyes and emulsions of increased quality and speed have become available, and the tripack recently put forward by Colour Snapshots is an attempt to dispense with the use of colour filters and to rely on the selective sensitivity of the superimposed films to secure the proper colour separation.

The most recent invention is a British one known as the Finlay Process. By this process it is possible to make a single exposure at very rapid rates through the Finlay screen on to a panchromatic plate. The Finlay screen itself is a screen giving in regular chessboard pattern the three optical primary colours. Because of the transparency of the medium used it is claimed that the colours possess a purity not possible in any other screen plate process. The single negative taken by this process is, by means of "stop-out" screens and a patented device of registering on the margined edges, used for making the three separated positives. This is the material given to the blockmaker, who can now make his own negatives without any further filtering or colour correction. The obvious merits claimed for the process are that it widens the scope of colour photography to include objects possessing movement, and that, as compared with direct photography, it trebles the amount of work which can be done, *e.g.*, in a picture gallery, in a given time.

A method of obtaining tri-colour record negatives with one exposure only has also been employed by Colour Photographs (British and Foreign), Limited, using an ordinary camera; the colour selection being practically as good as in negatives obtained by separate exposure through colour filters, and a method of producing colour photographs either from the pack negatives described or from three-colour record negatives obtained in the normal manner. Print-out images are produced in very thin transparent cellulose material in colours complementary to the three primary filter colours. These printing colours, as produced by light action on the cellulose sheets, are perfectly transparent and grainless, and for this reason produce, when the three image layers are assembled on to white paper, colour photographs of fine gradation and great depth of colour.

Meanwhile, the machine builders, the paper, ink, and photographic plate manufacturers have all contributed to the generally improved appearance that is seen in every class of colour printing to-day. Indeed, it might be truly said that they have been compelled to do so owing to the high standard of quality in the half-tone block which the photo-engraver has produced. The skill of the craftsman has to a very large extent been responsible for the attainment of this excellence. The tendency to-day is, however, to supplant the craftsman by introducing more perfect mechanical means. It is possible that the half-tone block would thereby become a greater commercial asset than it is even now, but it is hardly conceivable that a better article would be produced.

There are several reasons why it is not possible to eliminate the skilled craftsman. One is that printing ink manufacturers cannot make a set of tri-chromatic printing inks that are either permanent to light or theoretically correct in colour. This may not be easily understood when it is recalled that the autochrome and other similar processes can produce such beautiful results without recourse to any retouched hand-work. There is, however, this difference: the primary colours of light, orange, green, and violet, compose the picture of the autochrome, while the pigmentary primary colours, yellow, red, and blue, are used by the printer. Further, the autochrome is viewed by transmitted light instead of reflected light, which intensifies the brilliancy so much that the ink manufacturer cannot possibly produce the same effect in the form of a pigment.

The negatives obtained by the process photographer, therefore, need the assistance of the skilled craftsman to correct the colour values in accordance with the inks used. Were it possible to produce a set of tri-colour inks that are theoretically correct it would create a most exacting demand on all branches of colour production, and particularly printing. It would also settle a question of the moment as to the advisability of working to a standardized set of three-colour inks.

During the period from 1914 several inventions have been patented which have for their purpose the improvement of one or other of the mechanical parts of the process. One of these aims at the improvement of the half-tone colour negative by eliminating a screen of fine dots, which by the usual methods are invariably found to veil over the lighter portions of the picture. This is accomplished by a motor mechanism attached to the camera which gives a rotary movement to the half-tone screen during exposure. The effect obtained is what is known as a high-light negative, in other words, a negative in which there is a greater contrast between the high-lights and the shadows. There is also a lens which claims to obtain similar results by the simple expedient of having a specially shaped aperture, resembling in form two transparent right-angle crosses, which cross each other, the controlling action being made by the iris principle as in a lens of ordinary pattern. Other inventions have for their object the improvement of colour values in a negative. One, patented and worked successfully in America, is a specially constructed camera in which a negative corresponding to the subject being photographed is interposed between the sensitive plate and the lens.

Whatever improvement these inventions have made, they have not entirely removed the necessity of employing the craftsman for additional colour correcting. This is accomplished by the photo-engraver much more easily than has hitherto been found practicable by either the photogravure worker or by the photo-lithographer, and it is to the latter that these additional aids may be of greater service.

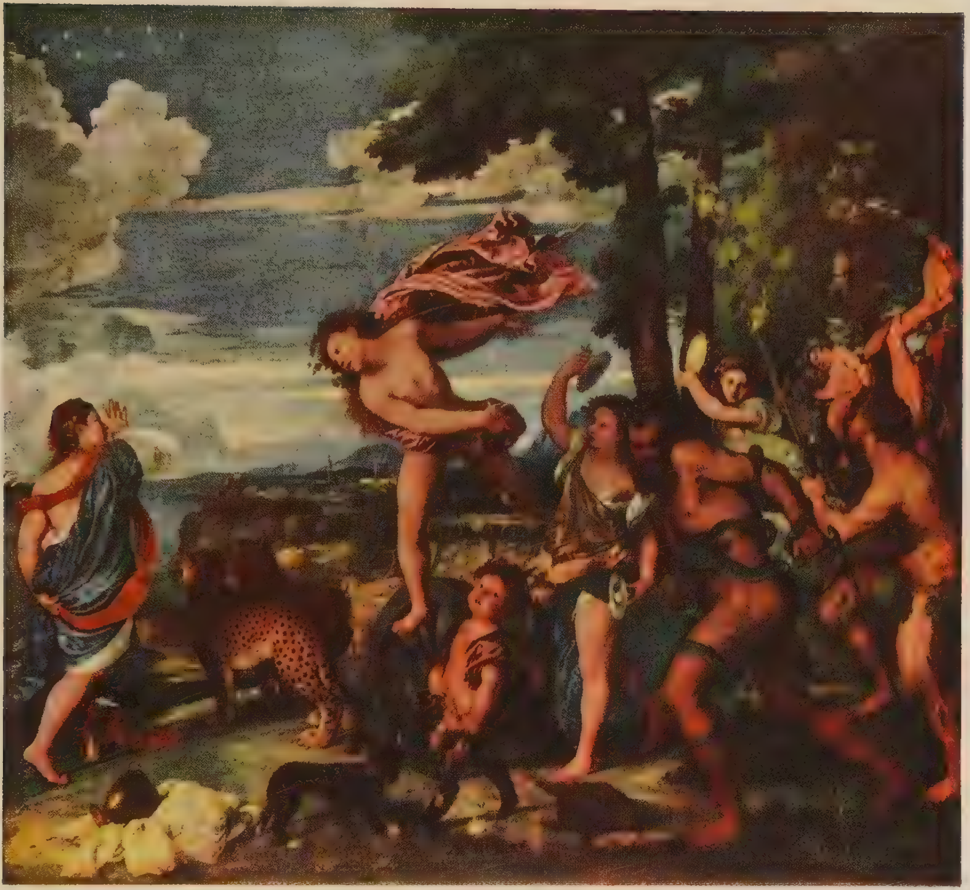
Many varied means have been proposed within recent years to make collotype more reliable and commercial, but this beautiful process has advanced more slowly than any other. Methods have been adopted by which the gelatine film bearing the image may be specially hardened in order to prolong the life of the printing plate, which under normal conditions is very short, and the printing speed very slow. It has been adapted to the rotary press in two ways—first by preparing the image upon a zinc plate, instead of the usual thick glass, secondly by using a transfer upon zinc from the original collotype film. Both these methods enable the printer to wrap the plate round a cylinder and print by the offset principle.

The work that has been accomplished in monochrome printing by rotagravure and by photo-offset at the outbreak of the Great War fully justified the belief of the printer that the development of colour printing by these two processes would rapidly follow along the same progressive lines. A general forward movement continued throughout the War, and all the conditions appeared favourable for the early application of the intaglio method to colour printing. The methods of production were sound, the printing comparatively easy, and the machines were capable of running at a high speed. Expectations, however, were not realized, and it is disappointing to find that it is only within the last few years that colour gravure has shown definite signs of progress in Great Britain. Other countries have more readily foreseen its possibilities, and have indeed surpassed us in the use made of it. This is the more remarkable when it is remembered that this country is the birthplace of rotagravure.

The old type of calico-printing machine has now become practically obsolete, and a new type, more akin to the fast-running letterpress, has been evolved capable of printing either in monochrome or in colour. These machines are much more in general use on the Continent and in America than in this country. It is an interesting fact that in Canada and America alone there are eighty or more newspapers using gravure, about nine of which are publishing sections of the paper in four colours. These huge machines are capable of taking printing cylinders up to 60in. wide, and to print at one operation the four colours on both sides of the web at a speed of 4,000 cylinder impressions an hour. These machines will considerably extend the scope of colour gravure. Instead of being used for catalogue work alone, as they are at present in this country, they will very soon be used for the same purpose as in America.

Another development which has taken place, and an extremely useful one, is the method of preparing the image upon a thin copper sheet, which is afterwards wrapped round a cylinder for printing purposes, thus displacing the unwieldy and costly cylinders. The copper sheets used were at first necessarily small, but machines are now made capable of using these sheets in size up to 54in. × 41in.

Remarkable progress continues to be made with photo-offset, although this may be more in evidence with monochrome than with colour printing. The application of high-speed reel-fed machines capable of dealing with large editions of weekly periodicals has been the principal factor in the success of this work. Another, perhaps, of greater importance is the use made of the photographic method of preparing the image upon the printing plate by the usual means of light-hardened bichromated albumen. Many advantages have arisen from this improvement. It has displaced the time-honoured custom of transfer, and in so doing has lengthened the life of the machine plate, which when so prepared has been proved capable of printing up to 90,000 impressions without signs of depreciation, and with half-tone screen work as many as 60,000. It has, therefore, placed in the hands of the lithographer the means of making the greatest use possible of half-tone for colour work. Without this means of preparing the printable image, it is extremely doubtful whether such a useful contrivance as the step-



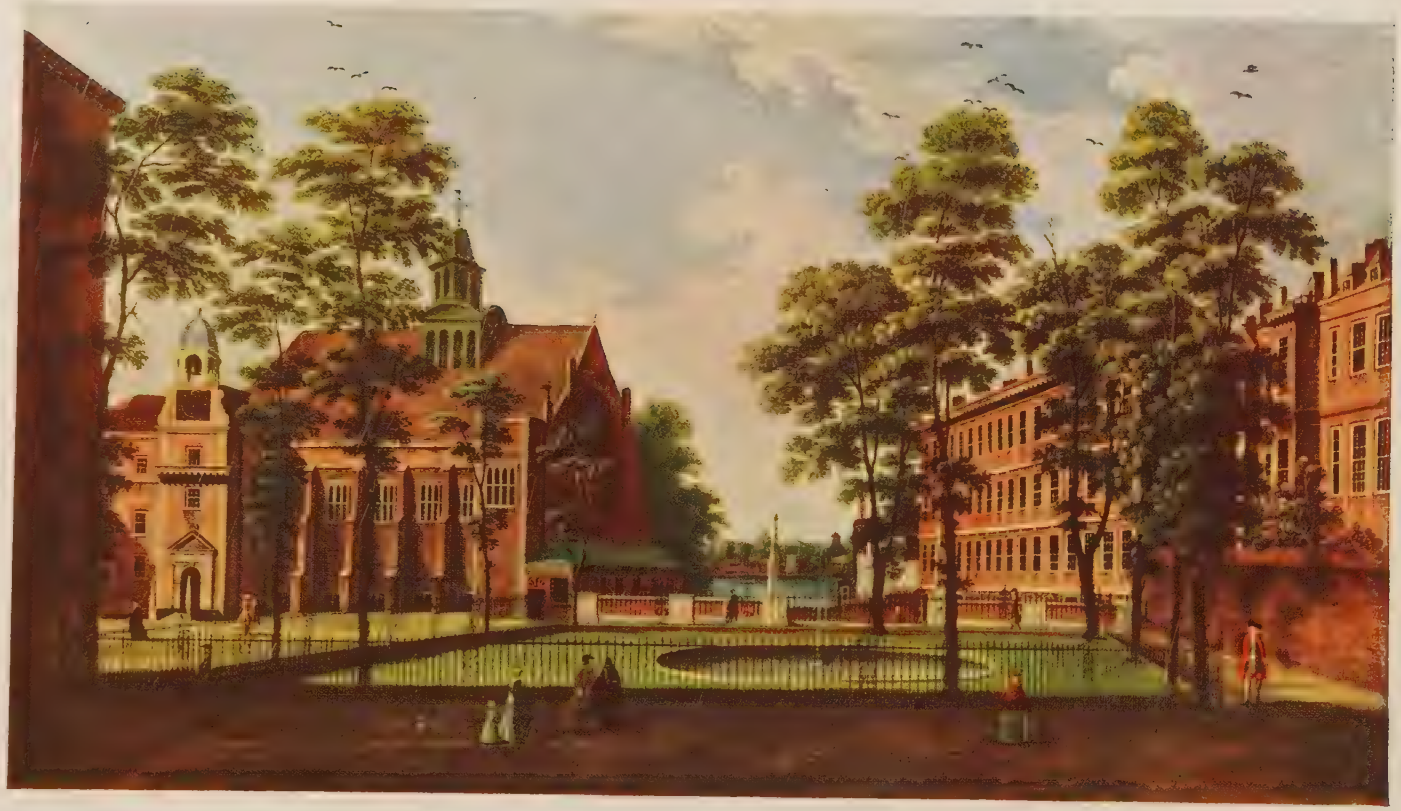
BY PERMISSION OF THE NATIONAL GALLERY

BACCHUS AND ARIADNE By TITIAN

As a work of the artist who is generally regarded as the supreme painter of the world—using the word " painter " to imply not so much greatness of conception or grandeur of design as mastery of colour and tone and the handling of pigment—there could hardly be a better subject for colour reproduction by mechanical means than the " Bacchus and Ariadne," by Titian, in the National Gallery. This picture (size of original 69 inches by 75 inches) was painted between 1516 and 1520, when Titian—who lived to be nearly 100—was about 40, on his first visit to Ferrara, for the Duke Alfonso I. Formerly in the possession of the Barbarini family, and at the Villa Aldobrandini, Rome, the picture was brought to England in 1806, and passed finally into the hands of Mr. Hamlet, of whom it was purchased for the National Gallery in 1826, two years after the first opening of that institution at 100, Pall Mall.

Though it has been chosen primarily as a test of the resources of modern colour printing, " Bacchus and Ariadne " has other claims than colour as a work of art ; for its vigour of conception and combined energy and balance of design ; and no picture has been more frequently analysed for students to show the rhythms of composition. Here it is only necessary to mention the skill with which the forward movement of the group is turned by the figure of Ariadne, with her pointing hand. The subject represented is the legendary marriage of Ariadne with Bacchus, personifying the return of Spring—the marriage being symbolised by the starry crown above her head, which Bacchus presented to his bride. In the distance is seen the departing ship of Theseus, who abandoned her at Naxos.

For us the picture has a special interest as evidence of the resources—lately extended by the purchase of the " Cornaro Family "—of the National Gallery in masterpieces of the Venetian School, for which the new room provided by Sir Joseph Duveen, opened this year, will provide increased accommodation.

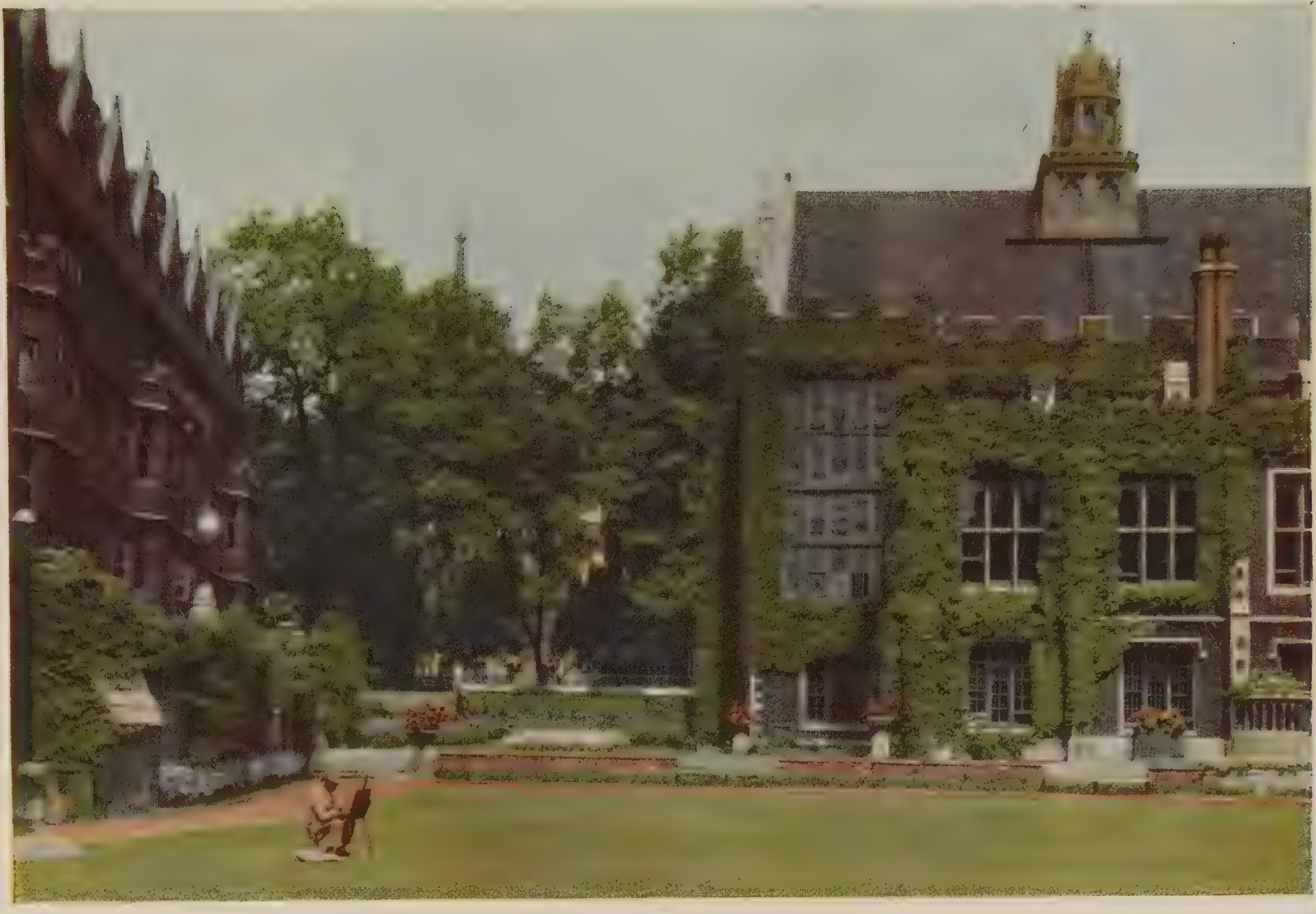


THE MIDDLE TEMPLE

(c. 1750)

By Samuel Scott

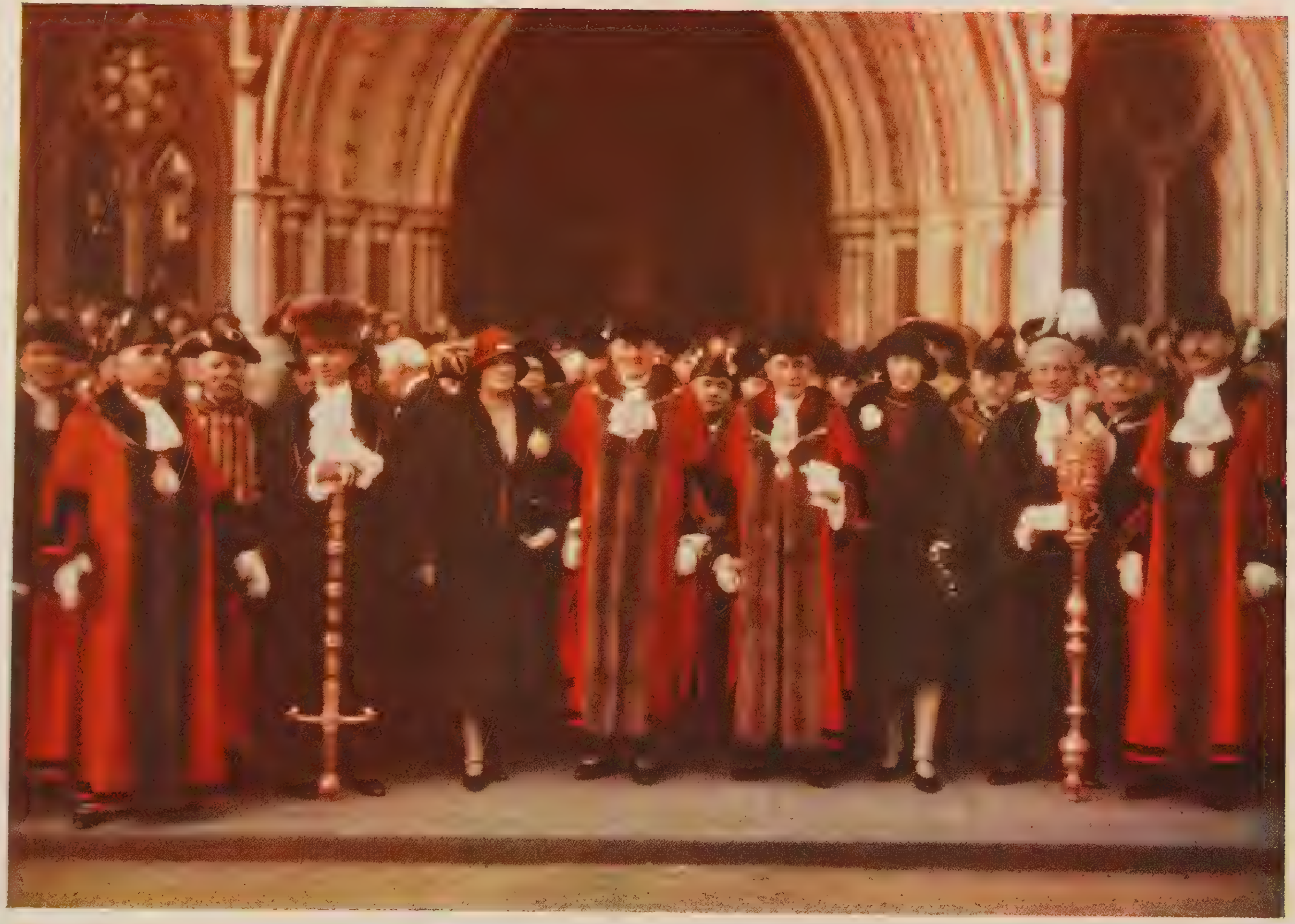
As illustrating the difference between "artistic" and "natural" colour, this picture and the one below make a very interesting comparison. Samuel Scott, a disciple of Canaletto and friend of Hogarth, who was born early in the eighteenth century and died in 1772, was a very truthful artist, but it is evident that in this picture the natural colours of the scene are slightly modified in accordance with a chosen scheme of warm green and brownish red—just as, in respect of form, the Gothic features of the building are "improved" according to the Renaissance preferences of the period.



THE MIDDLE TEMPLE

NORTHERN ASPECT TAKEN BY THE COLOUR SNAPSHOTS PROCESS OF NATURAL COLOUR PHOTOGRAPHY

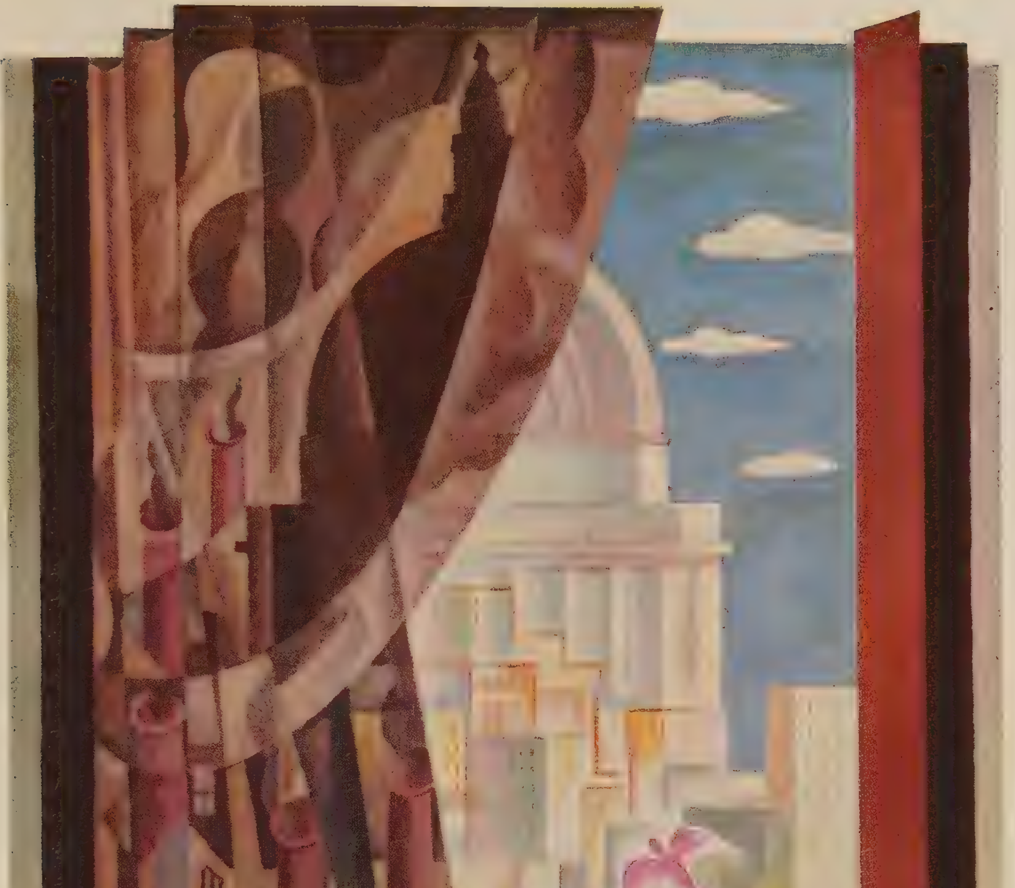
Here the natural colours of the scene are reproduced as they occur, without any attempt at arrangement according to a scheme. Taken together these two pictures of the same subject—though in different aspects—well illustrate the range of modern colour reproduction—as they also show that natural colour photography is of scientific rather than artistic interest.



A PRESS PHOTOGRAPH IN NATURAL COLOUR.

The new Lord Mayor of London, Sir William Waterlow (centre) with the retiring Lord Mayor, Sir Kynaston Studd, outside the Law Courts on November 9, 1929. The photograph was taken on Colour Snapshots plates with a press camera by a staff photographer of *The Times*.

H.H.V.Ltd.


GAS
is banishing the curtain of smoke
that keeps the sunshine from our cities

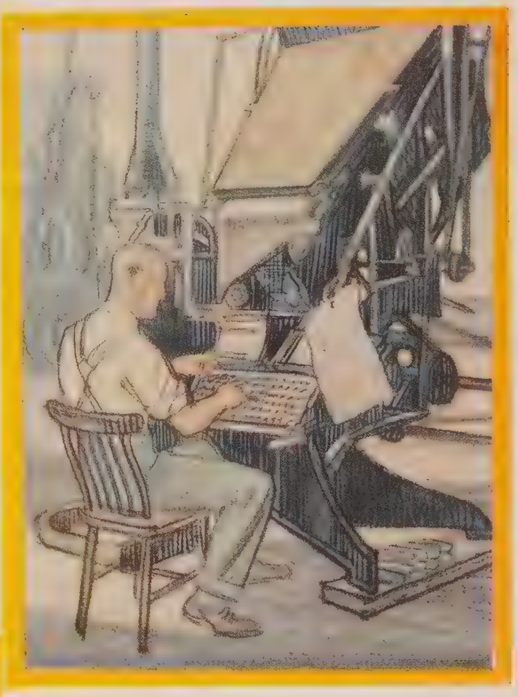
THE BRITISH COMMERCIAL GAS ASSOCIATION, 28, GROSVENOR GARDENS, LONDON, S.W.1

MODERN PRINTING: SPEED,

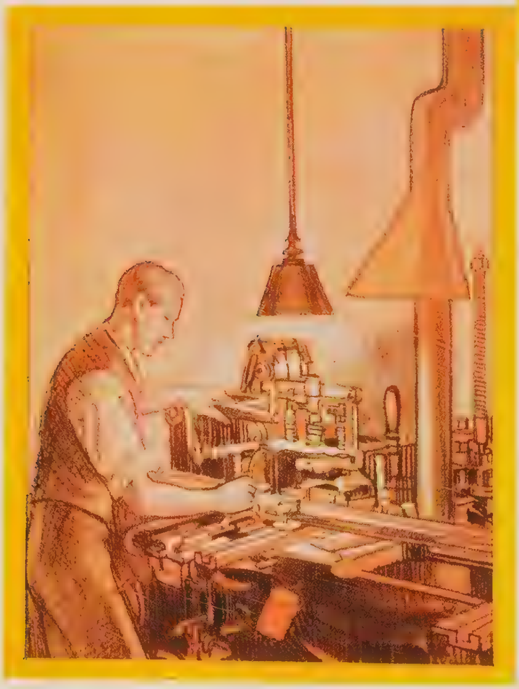
I IN this "age of miracles" it is perhaps natural that we should accept not only our daily bread but our daily paper with imperfect thankfulness. Most of us expend but little thought, and exercise even less curiosity, upon the mancraft that goes to make either the wheaten loaf or the printed page.

It is perhaps not strange that the town-dweller should give little heed to the golden grain behind the golden loaf; if he thinks of its history at all his thoughts go back no further than the bakery from which it was delivered. It is less understandable, in a mechanical age, that he should accept without questioning his unfailing daily paper—perchance its very quality of never failing begets in time a state of perfect unconcern. It is unthinkable that it should ever fail to reach his breakfast table—with its literary and pictorial news, coming to him through a chain of wireless stations, or as the result of the skill and daring of the "man-birds" riding upon the wings of the wind, through infinite space, in storm and sunshine.

Hardly less wonderful is the performance of the great machines—the inventions of men's minds, the creations of men's hands—that deal with the news and views, the word pictures and the photo pictures, after they reach those great printing palaces, the newspaper offices, whose chief centre in the metropolis of the Empire is by an appropriate chance christened by a name synonymous with "Speed," the name of its former little river—The Fleet.



Gas-heated Linotype Machine



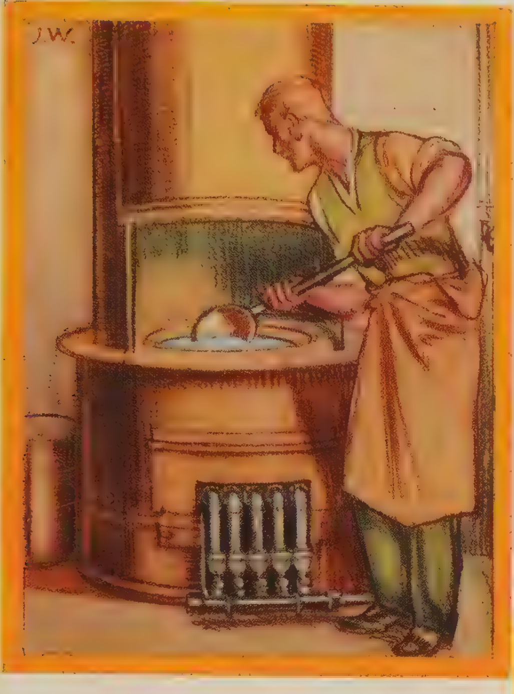
Gas-heated Monotype Caster

II FASTER than Mercury, the god with the wingéd feet, do the messengers of Fleet Street travel over land and sea fulfilling Leonardo's dreams. And also by methods of speed almost incredible, the hieroglyphics of the winged messengers are translated and transcribed into word and line, into print and picture; making food for the mind, stimulus for the emotions, and inspiration for the soul of man.

From earth's four corners the news comes rapping in on Tape and Creed machines, tapped out by unseen fingers at Reuter's and elsewhere. These strips and sheets would seem a perfunctory welcome to the world and its great events, jerking them along letter by letter; birth and death, armageddon and the first cuckoo, all is news, food for the sub-editors.

To them in vacuum tubes it is now conveyed, and by them restored to life and dignity. Then on to the copy desk in the composing room and set up on the great linotypes with their brass matrices, their 50-lb. pots of stereo metal seething above the gas burners, and finally the "slug" or "line-o'-type" itself; or the little monotype with its privy punchings in a code that only the operators and the casting machines divine. Among these casters conversation dies; from the undisciplined clatter of the composing room one passes into a rhythmic rapid beat, as of ship's engines. The multiple levers dance with the vigour, the perfection, and the intricacy of a Highland reel. More pots of molten metal and jetting gas.

ECONOMY, ACCURACY, BEAUTY



Gas-heated Melting Pot

III BUT news is seen as well as heard, and meanwhile in the process room they are at work on the line and half-tone blocks that will print the illustrations. Here all is peace and chemicals. The picture passes by photography from the drawing (or photograph) to glass, and from the glass to zinc (or copper), is etched and at last a proof is pulled, and the block proceeds on its way to join the settings in the make-up room. The whole process has been something of a miracle achieved with Dragon's Blood and other curious compounds.

IV FROM the composing room the proofs of settings travel along overhead conveyors to the reading room, as from a clamorous street into a City church. At first silence ; then the buzz of the readers' assistants, and one sees in endless little desks, as if telegraphing, pairs of men, one reading to the other. "O.K.'d" by them, the proofs travel on the wires again where "stab hands" make up the settings and blocks into a "forme," ready as it seems to print a full page.

But the forme as it stands, with its myriad and separate parts, has to be substituted with plates capable of printing off hundreds of thousands of copies.

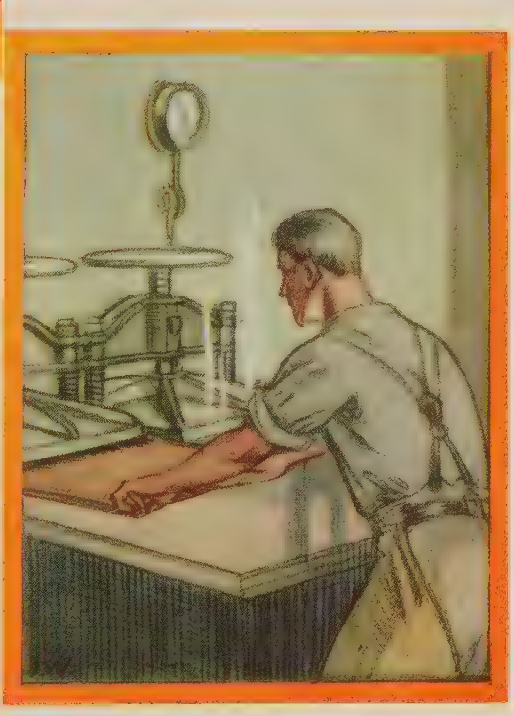
V IT enters the foundry over smooth metal tables and passes under presses, steam-heated from gas boilers ; and from the forme is taken the matrix, of a thin and it seems absurdly delicate fabric like blotting or packing paper. This is dried and curved on a gas-heated matrix dryer, and from it are cast the plates. The autoplate caster curiously resembles a blacksmith's forge, save that what looks like the coal is molten metal and the fuel is gas.

At last the plate is shaved, water-cooled, and brushed, and is translated, perfect and ready, to the machine room.

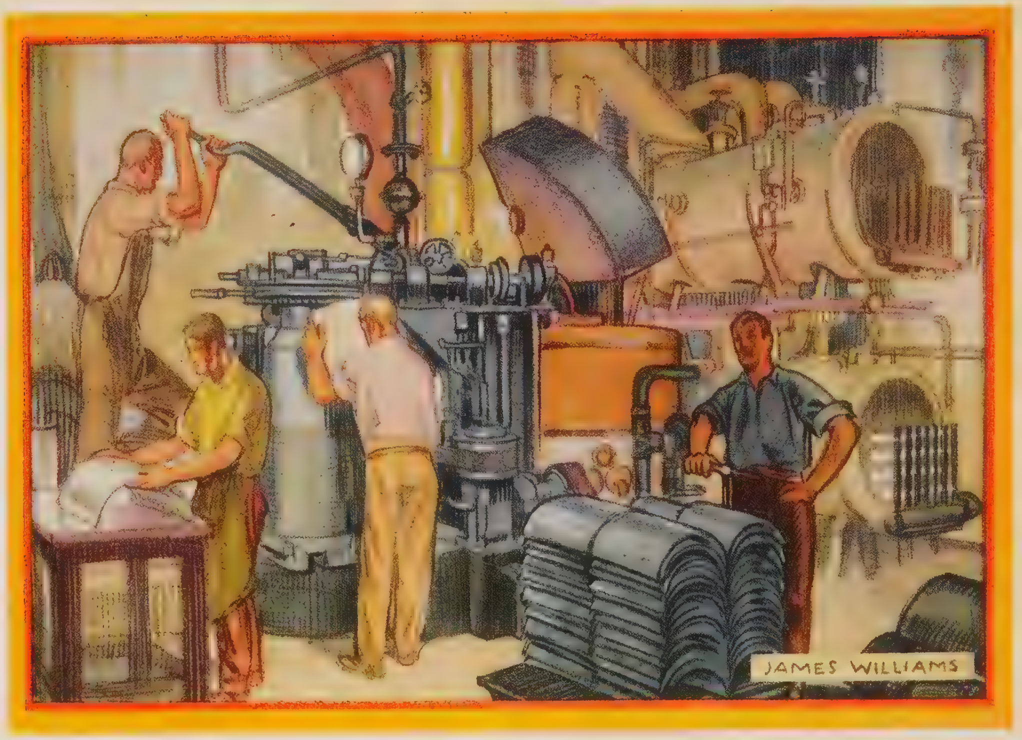
All that remains is to print.

The giant rotary machines, attended by countless priests each with his minutely appointed task, like Molochs await their five-mile rolls of paper. The plates as they come up from the foundry, each a half-circle, are fitted around the rollers of the rotary, as it were Moloch's teeth, and suddenly a thousand wheels revolve, the paper comes rushing through, each giant roller digests eight pages at a time, and, ingeniously folded and cut, the newspaper finally appears.

Outside, the great distributing organisation stands ready. Trains and planes and cars and runners, all straining at the leash. But that is another story.



Matrix Table heated by Gas-fired Steam Generator



Gas-heated Autoplate Casting Machine in the Foundry of "The Times"

VI TURN from the great newspaper to the smaller printing works. Fifty years ago the proud legend was " Steam Printing Works." In a business of any size steam power alone could give satisfactory and prompt results, but even then many of the smaller firms relied upon man-power. There would be perhaps a cylinder printing machine whose two fly-wheels were fitted with handles, and day after day men or boys took turns in grinding these round, securing a small and erratic output.

Gas first gave real assistance to the printer not with power or heat but in illumination. The incandescent mantle has brought compositors to say that nothing can equal gas light for softness and diffusion.

But to-day illumination is the least of the services gas offers to the printer. In the smaller works, as in the great newspapers here described, heat and power are alike supplied by gas.

Thus the first little gas flame, issuing from a home-made contrivance capped by his good wife's well-worn thimble, which was Murdoch's triumph of over a century ago, has added one more to our modern miracles. To-day millions of gas flames, of magnitude and intensity undreamt of by that great pioneer, enable the printed page to be produced with speed, economy, accuracy, beauty —to the great enrichment of man's daily life.

C. S. M. B.

THE GAS LIGHT & COKE COMPANY
LONDON

are freely at the service of printers and newspaper proprietors for expert advice upon all questions of lighting and heat treatment in the reconstruction or improvement of old works and obsolete plant, or the planning and equipment of new premises.

H.W.V. Ltd

and-repeat machine would ever have been built. By means of these machines any required number of duplicated images can be printed down on to a machine plate with accurate register for any number of subsequent colours. The mechanism is so perfect that register can be guaranteed to within 1-1,000th part of an inch.

The bane of colour printers, and particularly those connected with lithography, has been the varying atmospheric conditions under which their work is carried out in this country. Paper is so susceptible to moisture that the variations in humidity between one day and the next may be sufficient to cause a difference in measurement that will make the register of colour work extremely difficult. It has been the aim of printers generally to maintain the temperature of the machine room as uniformly as possible. The fact remains, however, that, though the temperature may be constant, the humid conditions may vary considerably. In America humidity is brought under control and has become a very useful servant. The colour printer there sprays moisture when necessary throughout the workroom by a special apparatus known as a humidifier, and is thus able to maintain, not only a constant temperature, but a constant percentage of moisture also. The introduction of the humidifier has not only reduced register troubles, but has resulted in other unlooked-for advantages, one of them being that the static electricity caused by friction on the paper has been reduced to a minimum.

H. T. G. M.

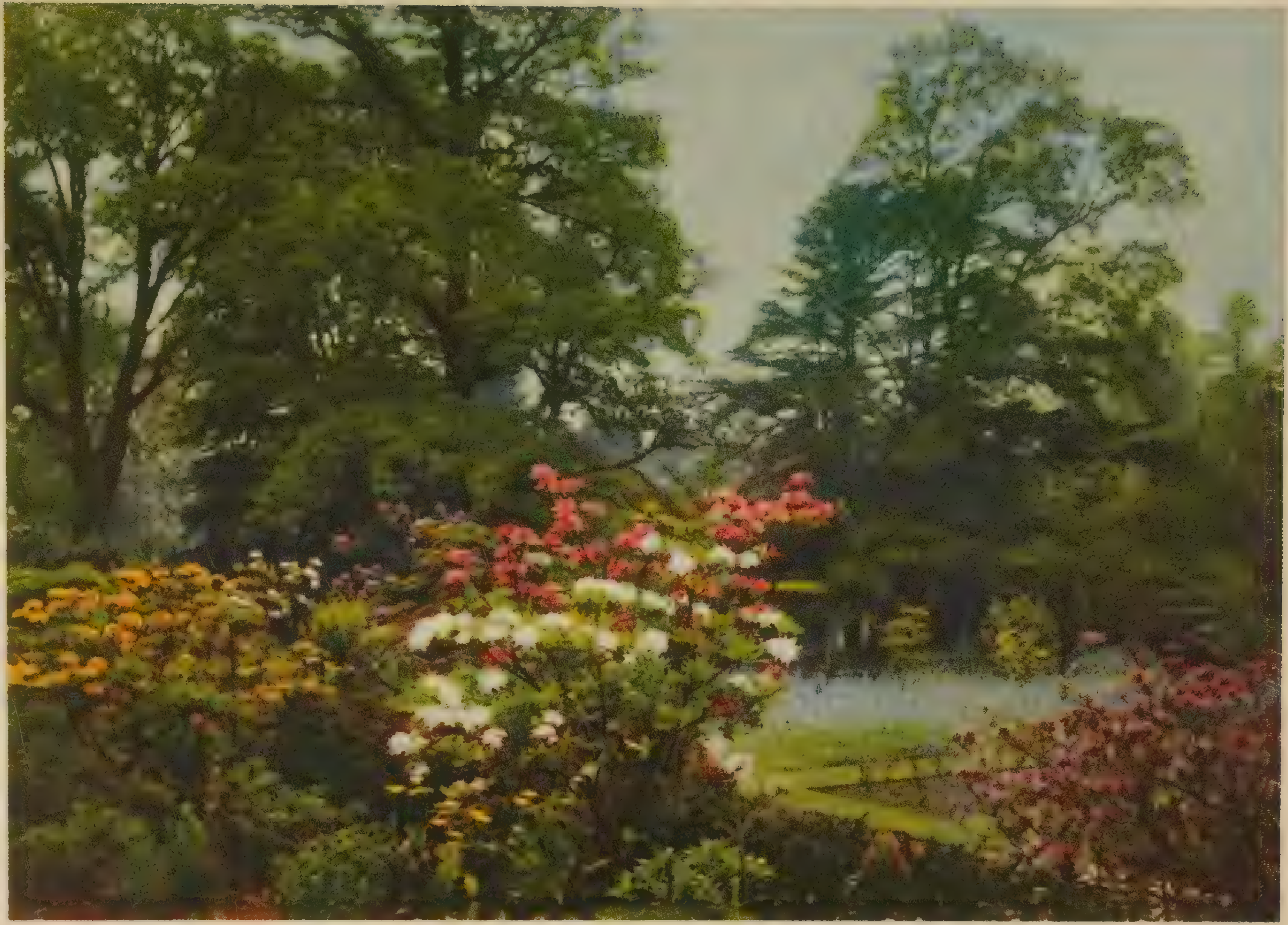
CHAPTER II

PHOTOGRAVURE AND LITHO-OFFSET

Since the photographic three-colour process became available on a commercial scale, colour printing for a number of years has been done mostly from three-colour blocks on letterpress machines. It took years for the lithographic trade generally to adopt any photographic methods and only when offset machines became perfected was half-tone used commercially. There is little difference in principle between the printing of monochrome half-tone and three-colour half-tone, so that experiments in three-colour offset printing followed almost immediately.

It may be inquired—Does any advantage accrue in colour printing by the change from letterpress to offset or photogravure? Each of these methods gives results of a well-defined quality, and the difference in the final effects is equal to that between a chalk lithograph and a wood-engraving or a copperplate etching. These variations provide a pleasant range of effects, and colour prints produced by alternative means may be preferred by comparison with letterpress colour prints on "art" paper with a chalk surface. Their value cannot be over-estimated, as they provide publishers and advertisers with new media of expression.

To define the appearance of a printed impression is as difficult as analysing any other intangible thing. An offset impression in colour is usually characterized by pastel-like delicacy, combined with a pleasing smoothness in the middle tones that may be lost by poor technicians. The solids rarely attain the rich vigour of a letterpress print and are usually matt, like a water-colour, rather than shiny as in an oil or varnish print. Recent progress has enabled the strength of the finished prints to be greatly improved, and further progress may be anticipated. It is to be hoped that the means whereby the pastel-like quality can be obtained on the offset press will not be forgotten as printers' knowledge extends. Future developments in colour offset obviously depend on the rate of technical progress. The general adoption of intaglio photo-litho processes, where the image is slightly etched into the metal, will increase the life of the plates and further improve the richness of the impressions.



AN EXAMPLE OF 4-COLOUR PHOTOGRAVURE

REPRODUCING AN AUTOCHROME ORIGINAL
ENGRAVED AND PRINTED BY THE
SUN ENGRAVING CO. LTD

The three-colour process applied to pigmentary printing on paper has definite limitations in the accuracy of colour rendering, and hand correction is necessary. In letterpress blocks this is easy, but in photo-offset the modifications of colour values must be done before the machine plates are printed. Much thought has been expended on methods to overcome this difficulty; and several processes are available that provide a marked improvement. Among the more recent of these are the Meisenbach Tief and the Beka Offsetdeep Process. Both processes are based on principles well known to practical photo-lithographers. Later investigation may result in further advances in photo-offset printing in colour, but the improvement in the past few years has been remarkable, and admirable results are now obtained.

In letterpress printing, commercially satisfactory results are normally produced in three printings, although the number may be increased to four if the additional expenditure can be covered. It was customary for lithographers to execute colour work with ten or even more printings when the colour selection was done by hand. It has been perhaps difficult for lithographers to realize that the number of printings can be so much cut down by the introduction of photographic colour selection. A few advanced technicians have shown that, given a suitable original, good results may be produced in three printings, but this is exceptional, the rule being to use four to six printings, each made on a three-colour basis supplemented by hand correction.

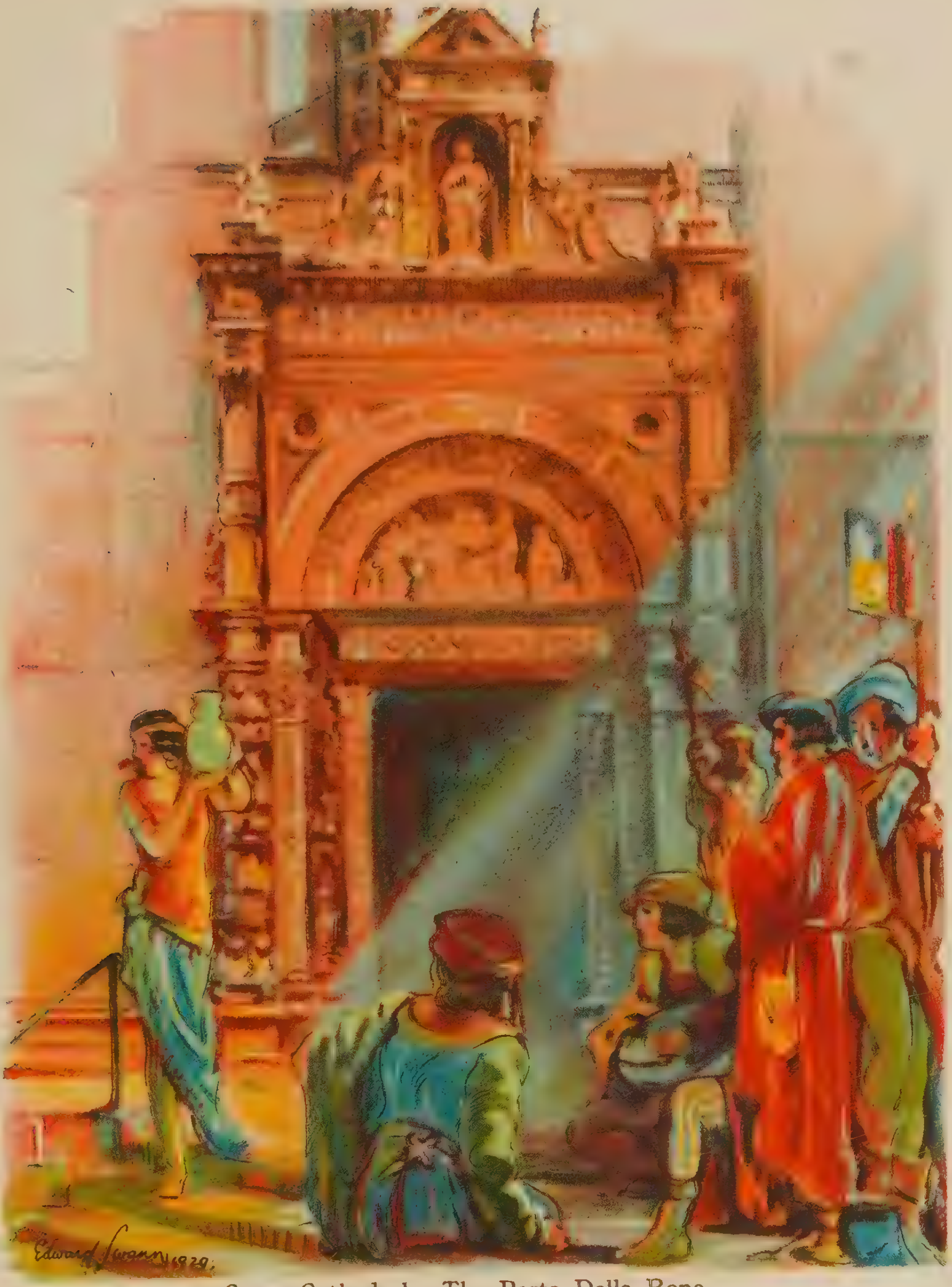
An important factor in the commercial development of offset colour work is the introduction of precision machinery in the photographic operations. Step-and-repeat machines are used enabling images to be duplicated on negatives or positives and these duplicated negatives to be printed down on machine plates exactly in predetermined positions. One of these step-and-repeat machines is the "Lithotex," which, with its companion the "Printex" machine, is manufactured in this country. These machines enable colour plates to be prepared correctly, and to register when they go to machine, whether the plate comprises duplicates of one job or a variety of subjects. This pre-accuracy represents an economy in machine-time over letterpress processes. The printing machines used for colour may be the same as for monochrome printing, but efficient two-colour machines, more economical in operation, are available.

Photogravure is unique, and the quality of impression unequalled. The printing areas of the cylinders provide films of colour, divided by a screen network into separate cells. The films of colour vary in thickness with the intensity of tone; light tones are thus correctly interpreted instead of being translated into solid but small dots, as in letterpress or lithographic work; the dark portions of a subject are represented by the thickness of colour transferred to the paper in printing. Photogravure thus gives an unequalled range of intensities and interpretations of tone values; and while the methods of colour separation are similar in principle to those in letterpress and offset colour printing, the result in the finished print is superior. Gravure in colour has the quality of monochrome with the additional advantage of over-printing even films of colour of varying thickness instead of dots of varying size.

Colour photogravure suffers with photo-offset the difficulty of correcting finished etchings, but the processes suggested for colour correction in the modification of values in negatives and transparencies in photo-offset printing are not necessarily suitable for gravure. The Rembrandt Intaglio Printing Company, during their work at Lancaster, for many years produced admirable colour prints, and since that time colour photogravure has developed both here and abroad. Sadag of Geneva has achieved at Paris notable successes, and among others in England a high standard has been reached by the Sun Engraving Company, Limited.

Most photogravure colour printing is done on sheet-fed single-colour machines, but these are now run three in tandem, the sheets passing in correct register from one machine to the next by means of automatic feeders. The output thus obtained may reach 3,000 complete copies an hour. Colour-gravure printing on continuous web machines presents great difficulties because the amount of pressure and the tension stretch the paper after each impression. These difficulties are being overcome, and the *New York World* and the *Chicago Tribune* now publish admirable colour supplements to their weekly editions. Registration is more difficult in modern photogravure machines than in multi-colour calico printing machines, where the material is continuously supported between impressions. The Prismatone Company have patented a colour-gravure machine embodying an electro-static device to keep the paper under control during printing, and this is said to overcome registration difficulties.

Advances in colour-photogravure have been overshadowed by offset, because the latter process is easier and cheaper to instal. But the beauty of photogravure cannot be equalled, and with improvements in technique further progress is expected. The introduction of chromium plating to prolong the life of cylinders should give considerable stimulus;


Edward Swann 1929.

Como Cathedral. The Porta Della Rona.

Designed and Printed by Haycock Press, by Photo Litho Offset in 7 colours

and if the use of thin copper plates instead of heavy copper cylinders prove satisfactory, printers would order gravure etchings as they now do their half-tone blocks. They would thus be able to undertake colour-gravure printing in their own shops with little or no disturbance of their present organization. It is on these lines that an extension of the commercial use of colour-gravure may be anticipated.

R. B. F.

CHAPTER III

THREE-COLOUR HALF-TONE

PANCHROMATIC PLATES

In the last decade, and especially within the past two or three years, there has been a growing improvement in the quality of three-colour half-tone. This is due not only to better blocks, but also to improved printing. There has been no essential change in the actual processes employed nor in the apparatus and materials used, but there has been a steady progress in the perfection of details. The photographic plate-makers are producing very uniform and reliable colour-sensitive plates, and they have undertaken a great deal of research work to determine the best colour filters for use with their plates. The ink-makers have improved their colours, and the greater precision of printing machinery has had an influence on the results. The paper-maker has also done his part.

The procedure in three-colour half-tone work is now practically the same in all shops. The colour filters are red, green, and blue, speaking in general terms, and they are either dyed gelatine films which are inserted in the diaphragm slot of the lens, or they are films sealed between two plates of optically perfected glass, which are placed before or behind the lens. The red filter produces the blue printing plate, the green filter the red printing plate, and the blue filter the yellow printing plate. The ruled cross-line screen is placed in front of the sensitive plate at the same time, so that the half-tone dot effect is secured in the same exposure as the colour separation. The screen is placed with its lines at a different angle for each colour, and to facilitate this angling circular screens with a rotary movement are used in the best practice, though the usual rectangular screens ruled at special angles are also employed alternatively. The object of having different angles—generally differing by thirty degrees—is to avoid the formation of moiré-like patterns on the prints through the interference of the dot effects of the three negatives when superimposed in printing. The variation of the angles places the dots in juxtaposition rather than superposition, and the more perfect this effect the better the results in the final printing.

The photographic plates are known as "Panchromatic," which means that they are sensitive to all colours, and this enables one kind of plate to be used for the three negatives. Naturally, the exposures are long compared with those in ordinary photographic work. Illumination is by powerful arc lamps, burning carbons which are chemically prepared for giving a pure white light. For commercial objects, especially carpets, fabrics, &c., daylight illumination is adopted, but in this case the indirect method is resorted to for the best results. In this way the colour separation is made without the half-tone screen, the negatives being then in continuous tone, and a set of positives is made from them to be used as "copy" for producing the half-tone negatives.

Once the negatives are made the subsequent procedure of printing the image on to the metal plate and etching is the same as in the ordinary half-tone process, except that a greater amount of work is done in the way of retouching, by what is known as "fine etching." The excellence of the results is due in a great measure to the skill employed in this stage of the process. The "fine etcher" has to compensate for the imperfections of the photographic part of the process and of the printing inks.

Until recently there has been no common standard for these inks, and printers have had to use the inks employed by individual blockmakers, but a movement for standardizing, which is now being brought about by the cooperation of the printers' and photo-engravers' trade associations, is likely to tend to some measure of uniformity.

The position of three-colour work to-day may be summed up by admitting that there are imperfections to be overcome in regard to photographic plates, colour filters, and inks, as well as in the inherent defects of the half-tone process. As these problems are gradually solved, so far as they can be, the process will become more easy and certain in operation by reducing the amount of manual skill which has now to be applied to the production of first-class blocks.

The introduction of a fourth printing, usually in black, compensates for some of the defects of the three-colour method, but the additional expense of another operation, both in the engraving and the printing, is a serious objection in these days when the cost of blocks and printing is relatively high. There has been a tendency to see what can be done with only two printings, and some engraving firms have produced excellent results where the subject lends itself to such treatment.

In three-colour photography, apart from its process applications, there have been many ideas put forward for securing three-colour records, from life as well as from still objects, either by a single exposure or by rapid consecutive exposures, and it may be that these inventions will be the means of providing the photo-engraver with negatives or colour prints of subjects which could not be reached by the process camera.

W. G.

CHAPTER IV

COLOUR PRINTING IN NEWSPAPERS

PROBLEMS TO BE SOLVED

Many difficulties have to be surmounted before colour printing will be possible in newspapers, even if restricted to certain days in the week. The rapid strides that have been made in producing monochrome pictures, and the excellent results obtained, have led newspaper owners to turn their attention to colour, both for their topical illustrations and advertisements. Excellent and beautiful reproductions are being obtained in weekly and monthly periodicals printed on flat-bed or sheet-fed rotary machines, but to obtain the same high standard of production both as to register and quality on a reel-fed high-speed newspaper press, where quickness of preparation from the originals and quantity of production of the journal are necessary, is quite a different matter.

The first essential for colour work in newspapers is rapid preparation of the subject, and of the printing surface. Whereas now a photograph can be taken of any subject and practically at any time, and the printing plate prepared in a few minutes, some considerable time must elapse before printing surfaces either for two, three, or four colours can be completed. For advertising purposes articles such as coloured goods can be photographed through colour filters direct from the originals, and advertisements to be produced in colour can be arranged some time in advance.

The last few years have seen the introduction of several methods for photographing direct in colour. Two at least of these allow pictures to be taken directly by means of an ordinary camera. Experiments have proved that these methods can be used for the purpose of taking Press illustrations, provided that any movement in the subject is not too rapid to obtain reasonably good exposure. The picture showing the Middle Temple Hall, in the colour section facing page 136, is a case in point. The photograph was taken on a fairly bright day with a very short exposure by means of an ordinary camera, and the picture has been reproduced direct from the original negatives. With this advance in the art of colour photography the principal obstacles to success in colour printing for newspapers seem now to be on the mechanical side. Analysing these obstacles in their sequence, it is evident that the time taken in making the necessary colour blocks must be greatly reduced, and yet allow time for some fine etching. Whereas the preparation of the black-and-white half-tone block is comparatively simple, the preparation of colour half-tone blocks calls for a much greater effort on the part of the block-maker. Even when the blocks have been perfectly made it is difficult to combine their colours and transfer them in perfect register to the newspaper page, and the problem before the minds of newspaper owners is to select the best method from the processes available.

There are three processes of picture reproduction which at present seem applicable to colour work in newspapers—namely, intaglio, in which the image is etched below the surface, such as the photogravure process; the planographic, or level surface, in which the parts not to be printed are treated to resist the ink, among which are the photo-litho or offset, and several systems in which mercury is used; and the method of printing from a raised surface, such as half-tone stereos, or electros. All three methods have their advocates, and many experiments are being undertaken by machine-press builders, printers, and others engaged in the industry to perfect, simplify, and quicken them. The difficulty at present is to determine which of these three methods should be harnessed to the modern newspaper press. The selection is not at all easy, as all three, in their different ways, present defects which have not at present been overcome when applied to fast-running newspaper presses.

For depth of tone and brightness and general excellence the intaglio process has much to commend it, but the process is slow, expensive, and slow-running. Several makers are experimenting by combining an intaglio unit with an ordinary letterpress unit, and running them together, and have met with some success, but the slow speed of the intaglio cylinder limits the speed of output. Experiments are also being tried in combining offset and stereo, but so far without satisfactory results. In both of these cases there are units printing by entirely different processes, which does not tend to harmonious running. Even for a few pages with only two or three colour illustrations the machines are of considerable size, and one capable of printing a paper of thirty-two to forty pages would have to be a gigantic and cumbersome affair. The problem would be simplified and the machines reduced in size by using one or other of the planographic processes—in particular, a process in which brass shells are used exactly the thickness of the stereoplates would enable all units to be similar.

Many experiments, more or less successful, are being made to print colour illustrations from ordinary stereos; and here again the printer is confronted with several problems. If he wishes to print from stereos, using spiral cylinders for easy adjustment and registration, he again has dissimilar units. Undoubtedly the simplest method is to use ordinary stereoplates.

All the leading machine-makers are willing to build machines to print by any method that may be chosen, but no large machine to produce coloured illustrations throughout a thirty-two or forty page newspaper has yet been constructed. One machine made by the M.A.N. Company is actually printing a daily newspaper with coloured illustrations from stereoplates and has been in operation for about a year. The paper is the *Express Poranny*, published at Warsaw.

It is probable that when newspapers with illustrations in colour are published they will be printed on a press in the form of line units having colour decks above, so that the lower units will print in black and the sheets diverted to go through the upper deck to receive their colour.

CHAPTER V

MAGAZINES AND BOOKS
ILLUSTRATION IN COLOUR

The conditions of a "perfect" colour process we may take to be:—

(1) That it should provide a facsimile result from any class of original.

(2) That it should be adapted to print in quantity on any paper of reasonably good quality.

(3) That it should be economical in price and working.

The perfect colour process has yet to be found. There is no process which satisfies all these conditions, in spite of the number of experiments, and often brilliant experiments, that have been made of recent years. For general use in books and magazines the three-colour photographic method, or four-colour as the use of a key block makes it, holds the field, inasmuch as it enables a number of subjects which may vary greatly in technique one from another to be reproduced in the same way and printed together.

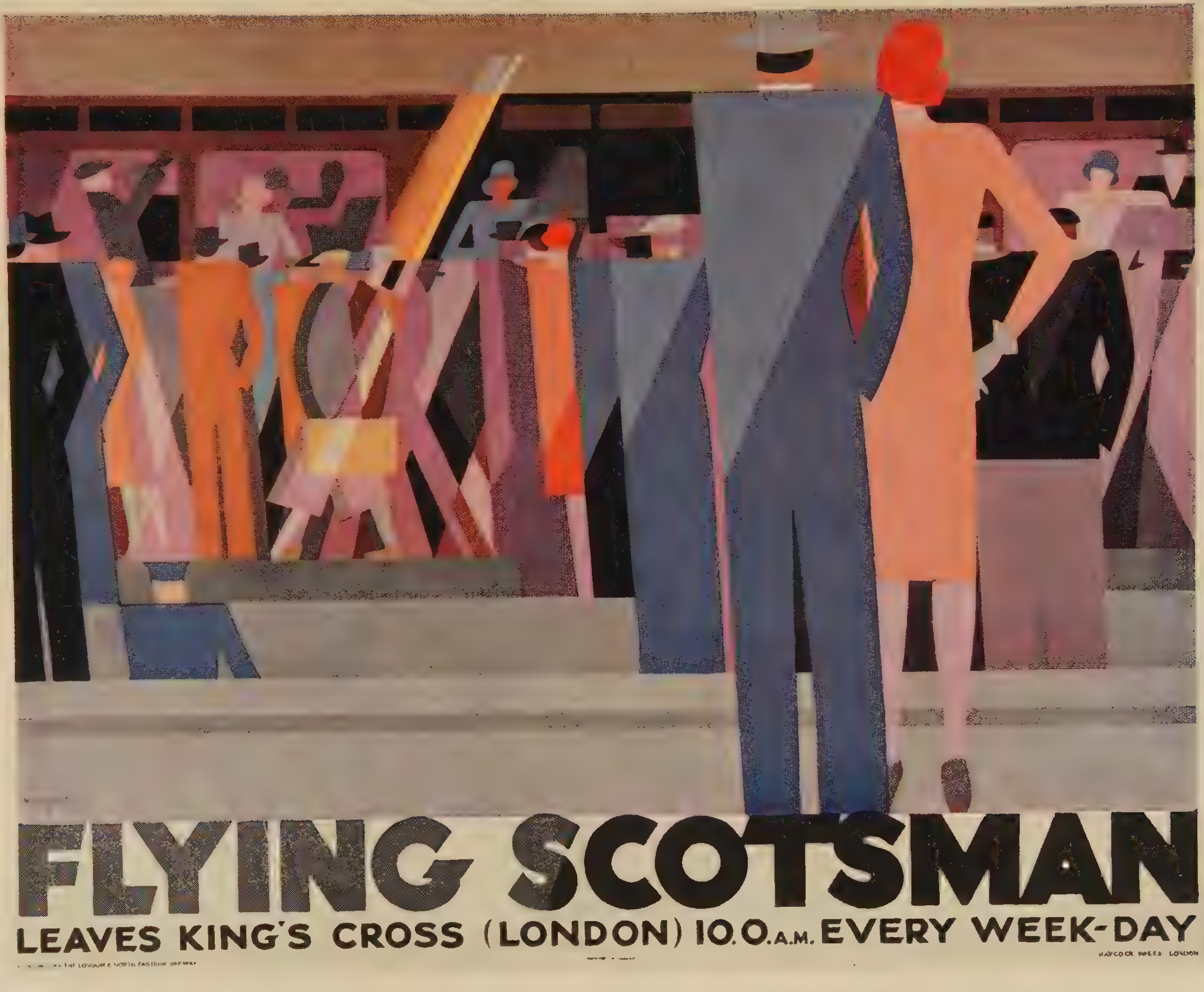
The two main defects of the three-colour are:—

(1) The mechanical screen, which distributes a faint pattern all over the reproduction and consequently destroys quality.

(2) The necessity of printing on highly glazed clay-coated paper.

The first defect is inherent, and it is chastening to look back, as one may, for instance, in the *Studio*, on twenty-year-old reproductions that are as good as any three-colour work that is being produced to-day.

Successful attempts have been made in recent years to overcome the second difficulty—paper. Special methods, as, for example, Blackmore Tintex, the main feature of which is a deep etching and hardening of the blocks, have been devised. The block is forced into the paper under extra pressure, the roughness of the paper is counteracted, and the screen is less apparent. A pleasant, even quality of unglazed paper is thus obtained, though it must be admitted that this is accompanied in some cases by a certain loss of accuracy.


FLYING SCOTSMAN
LEAVES KING'S CROSS (LONDON) 10.0 A.M. EVERY WEEK-DAY
HAYCOCK PRESS LONDON

odern poster executed by lithography in 17 colours for the London and North Eastern Railway.

Other processes which are increasing in importance are greatly superior to three-colour in particular directions, though they do not satisfy all the conditions postulated so well as three-colour. They are individual and specialized processes which offer only a partial solution of the problem. One of the most interesting is Pochoir, a modern development of the stencil (and of an ancient practice employed, for instance, on fourteenth-century playing cards). The colour stencilling is used on a key reproduction, in line, collotype, or lithography, as best suits the subject. The freshness and brilliance of a water-colour or gouache are the qualities attained. For the reproduction of an old-master painting it is clearly unsuited. It is not suited even for very precisely handled work, and the amount of human labour involved is naturally a consideration of expense. It is at its best in the illustration of books in limited editions, for which designs have been specially made to suit the process.

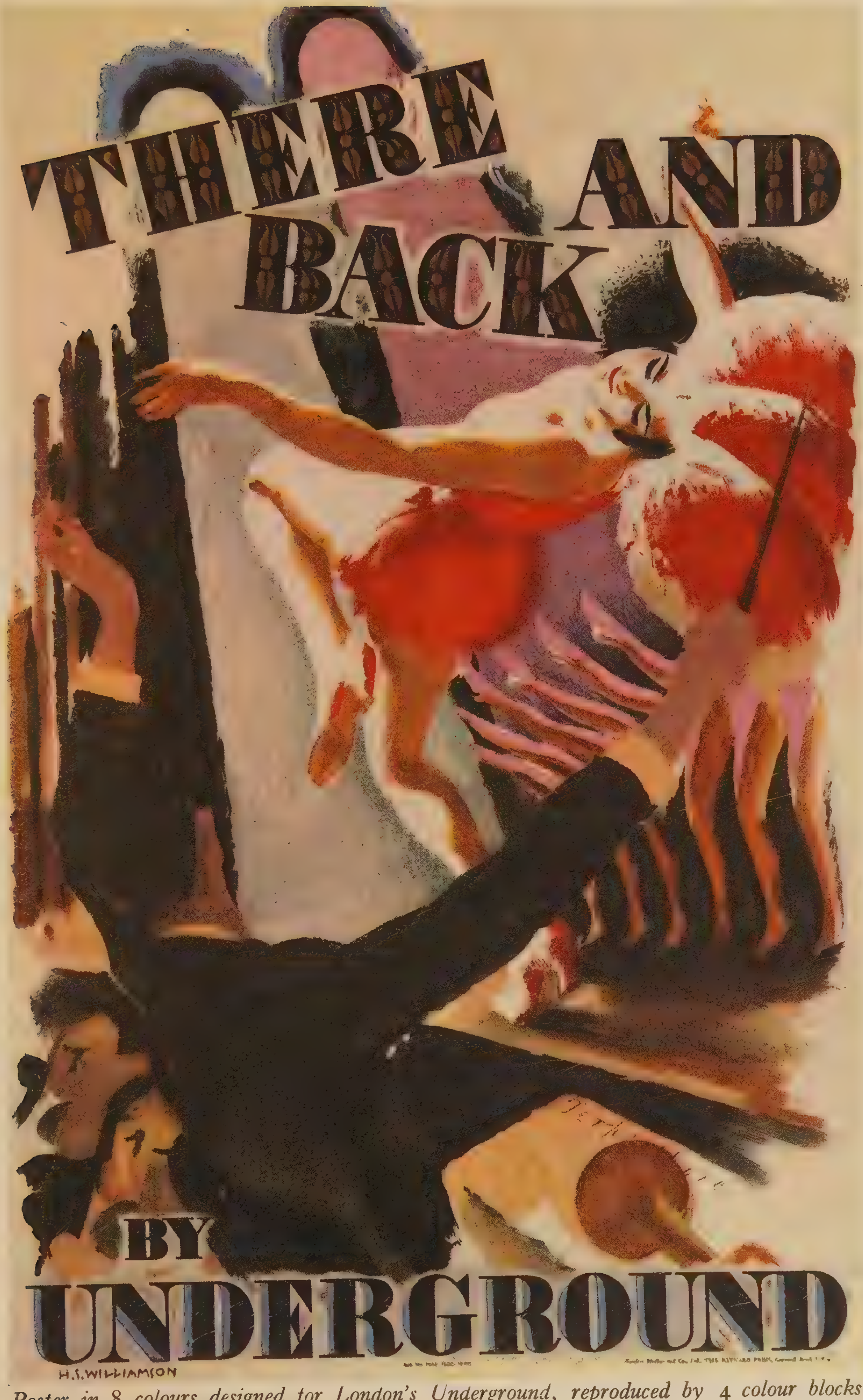
Colour collotype, which is gradually coming more into use, has still to reach the economic stage. It is a kind of photographic printing with greasy inks, moisture-laden gelatine holding the ink in its reticulations. It is expensive, though it has an exquisite texture and dispenses with the mechanical screen. Here again the original must be of a special type to suit the process.

Colour photogravure is also on the verge of expansion. It has a much less obvious screen than three-colour and can be used on rough-textured paper. It can also be used for reasonably large editions at prices which compare favourably with those of the three-colour process. Its drawback, as the writer of this article has found it, is an uncertainty in the result, which tends to vary both from the original and in individual prints.

The offset processes which have been strongly cultivated in Germany—the principle of which is the transmission of a reverse image *via* a sheet of rubber to the paper—do not yet commend themselves to general use, though for particular purposes the result can be so faithful that the reproduction is almost indistinguishable from the original. How far the fidelity of offset is now carried may be seen in the drawings of Alexander Jacovleff reproduced in the "Croisière Noire," published by the Citroën Company.

As things stand, in the reproduction of works of art one principle is clear, that the success of the process is bound up with the character of the original. The facsimile idea is all-important, and a greater adaptability in this respect is still required before we finally conclude that the limit of progress has been reached with existing means. Photography, which is the basis of modern colour printing, still leaves room for improvement, and its inaccuracies in recording colour values throw too much work on to the subsequent process of colour etching. We ask the question: What possibilities are there in the direct printing on sensitized paper of colour photographs? Time and research alone can answer it.

C. G. H.


THERE AND BACK
BY UNDERGROUND
H.S. WILLIAMSON

Poster in 8 colours designed for London's Underground, reproduced by 4 colour blocks.

CHAPTER VI

THE COLOURED POSTER

BRITISH ARTISTS AND PRINTERS

Viewed from the broad standpoint, the coloured poster of to-day signifies a good deal more than meets the eye, for it represents a mental force, a point of view, and an activity essentially developed through, and by reason of, the scheme of civilization which this present century stands for. With daily needs and human interests growing more complex, and at a time when individuals look more than ever to the world rather than locally for supplies, stimulus, or relaxation, the poster, silent salesman or proclaimer, ever grows in importance. Publicly exhibited, it may not be avoided. It is seen by very many people, and although its message is not always clearly comprehended by every observer, it is nevertheless a potent factor in everyday concerns—aiding buying and selling, telling us what and where to eat, suggesting holidays and amusements, helping to fight elections, forwarding religious and social movements, and directing attention to a thousand and one other daily activities.

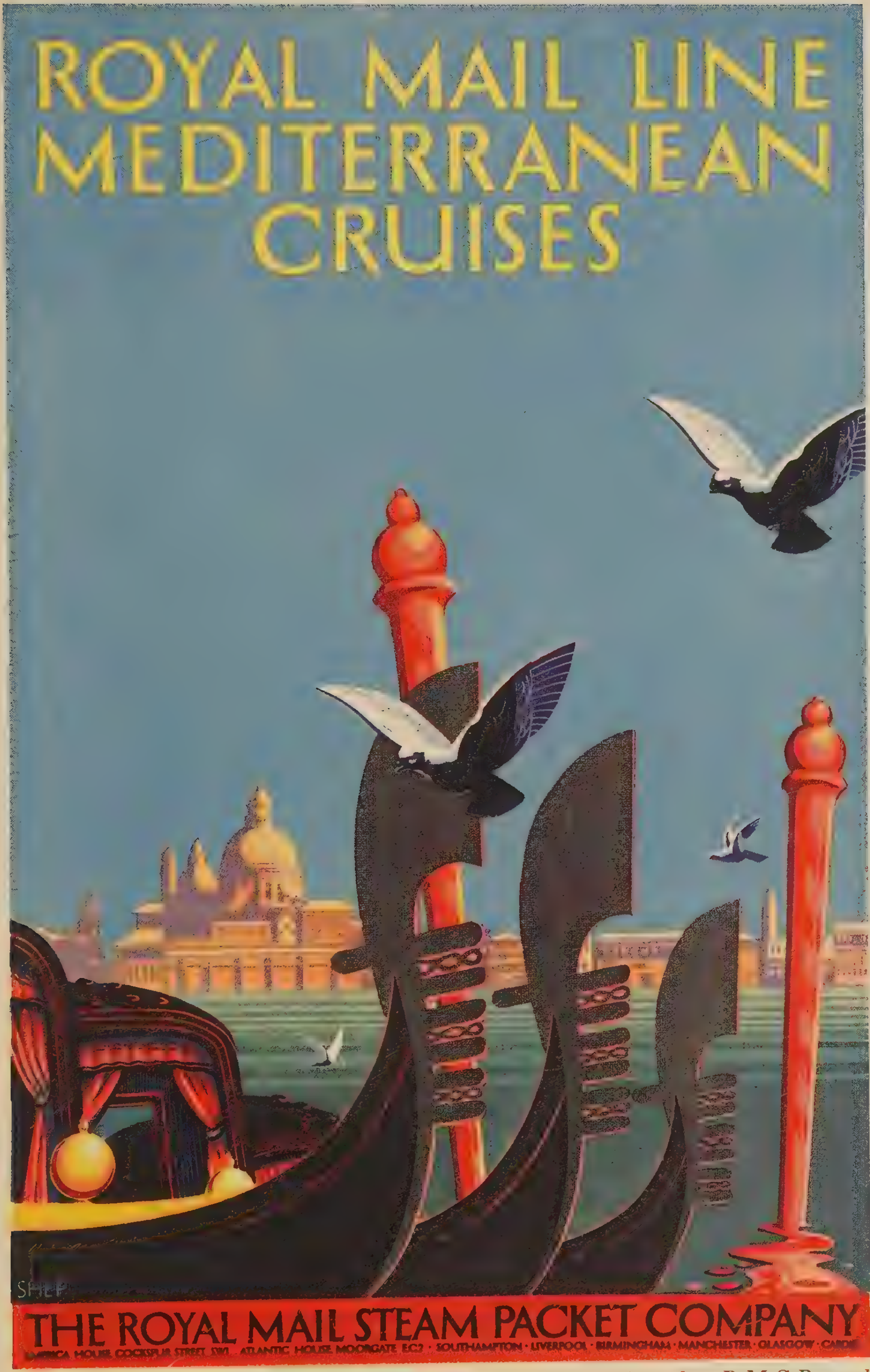
Constant demand has stimulated supply, and holding the important place it does it is not surprising that the modern poster has brought notable developments to the realms of printing and art. With the growth of advertising into a specialized science, the poster, in common with all forms of publicity, has been affected. Gone are the days of unconsidered advertising when printed matter, schemed with little knowledge and produced without necessary exactitude, was launched upon the hoardings, with luck constituting its chief hope of success.

Nowadays the poster is a very particular thing, the result of much thought and deliberation. The kind of appeal needed to awaken interest in the public to whom it is directed, consideration of method, ways and means, and possible results, acute analysis of the man-in-the-street's way of thinking, and other tasks of advertising experts have to be completed before matters of design and printing can be entertained. Then the practical work of artists and printers follows, all directed towards the preconceived end in view. Thus it will be seen that the coloured poster, as viewed from the streets, happens neither by chance nor accident, but comes into being through the cooperative efforts of many people; successful and popular examples only reach their final forms after months of planning and experiment.

To the artistic aspect of the poster, essentially the designer's province, modern conditions have brought far-reaching consequences. The demand for poster work that is strong in appeal, exact for time and place, bold in execution, suitable for reproduction on a large scale, and meritorious withal, has stimulated the growth of a school of artists that is fully capable of meeting the demands of advertisers. Each of these artists is a craftsman in the true sense of the word, supplying a definite need, accepting limitations, and turning to good account the possibilities of subject and medium.

It is not too much to state that the evolution of the poster has been the primal cause of one of the most interesting and fruitful phases of present-day art in which colour is the predominant note. Consequent upon the demand for good posters printers have joined in the march of progress. They have proved themselves to be apt for the innovations and experiments which changing fashions in style and effect have made necessary, until there is practically no difficulty of interpretation of original designs that cannot be surmounted. Relying usually upon lithography for the method of reproduction, printers in Great Britain are producing some of the finest colour-work in the history of the craft. In practice, lithographic draughtsmen generally undertake the reproduction of the designs, but the method employed by such artists as Frank Brangwyn and G. Spencer Pryse, who draw their designs directly upon the lithographic stone, might be more commonly followed for the betterment of the subject under review.

Although the coloured poster as we know it is by no means an ancient method of public appeal, it is old enough to have gathered traditions of its own. With the passing of years there have been notable periods—the glorious days of Chéret and his compatriots in France; America's golden age, which yielded such names as Bradley, Penfield, and Maxfield Parrish; and our own nineties, notable still for Beardsley, the Beggarstaff Brothers, and Dudley Hardy. This century brought the powerful German movement and Ludwig Hohlwein, and the clever manipulation of flat colours, in turn quickly followed by mid-European activities, chiefly centred in Vienna. More recently the new British school arose, and dominant influences emanated from France.


ROYAL MAIL LINE
MEDITERRANEAN
CRUISES
SHEP
THE ROYAL MAIL STEAM PACKET COMPANY
MERICA HOUSE COCKSPUR STREET SW1 · ATLANTIC HOUSE MOORGATE E.C.2 · SOUTHAMPTON · LIVERPOOL · BIRMINGHAM · MANCHESTER · GLASGOW · CARDI

Poster in 10 colours designed by The Baynard Press for the R.M.S.P. and reproduced by 4 colour blocks.

But the poster, though it owes something to past practice in the realm of design, is always a thing of the present. It is particularly susceptible to every change in fashion, is moulded by current events, and is affected by advancing artistic impulses. Herein lies its strength; and in shaping an art that is thoroughly of our time, and in accord with progressive thought, British poster artists have worked with conspicuous success. Line and pattern, great dexterity in the handling of colour, symbolism and suggestion, and the decorative treatment of scenes and objects are some of the attributes of this most recently developed aspect of our art. The tragedy of war and the greatness of modern industry have never been more vividly rendered than through the noble posters of Frank Brangwyn; Wembley Exhibition brought a fine output of coloured bills, notably one of unusual dimensions designed by Fred Taylor; London's "Underground," the real pioneer of the good poster movement, has been ably served by E. McKnight Kauffer and a host of other artists; the activities of the Empire Marketing Board have been responsible for many excellent designs, while Maurice Greiffenhagen, F. C. Herrick, George Sheringham and Gregory Brown, Norman Wilkinson and Tom Purvis, W. H. Barribal and Septimus Scott are but a few of the designers who are regularly producing a wide range of decorative and colour effects that together make up the picture gallery of the man in the street. S. R. J.

PART VI

THE NEWSPAPER AND PERIODICAL PRESS

CHAPTER I

ORGANIZATION OF "THE TIMES"

THE EDITORIAL DEPARTMENT AND THE MANAGEMENT

The Times newspaper and its subsidiary publications and the printing works which print them are owned by The Times Publishing Company, Limited, the affairs of which are managed by a Board of Directors. Major the Hon. J. J. Astor, M.P., the owner of the largest holding in the company, with the concurrence of Mr. John Walter, decided to appoint a Board of Trustees for the purpose of safeguarding future transfers of the controlling shares in the company. The trustees are the Lord Chief Justice of England, the Warden of All Souls College, Oxford, the President of the Royal Society, the President of the Institute of Chartered Accountants, and the Governor of the Bank of England, and it would rest with them to prevent ownership of what is, in effect, a national paper from being regarded as a mere matter of commerce to be transferred, without regard to other circumstances, to the highest bidder or allowed to fall into unworthy hands.

The executive heads of *The Times* are the Editor and the Manager.

At the head of the Editorial Department is the Editor, who is its absolute chief. On him alone does it rest to say what views the paper shall take and what its leading articles shall say. Immediately under him are two Assistant Editors, one of whom works by day and the other at night; and there is also a Night Editor (with an assistant), whose duty is to "make-up" the paper—that is, to arrange the articles and pages in it—and to decide what, of such matter as may be optional, can be and what cannot be included. Beneath this central control come the various departments. These are leader-writers and other writers, whose pens are not confined to one particular subject. Ecclesiastical affairs, science, agriculture, the estate market, labour questions, the Law Courts, the fighting Services, medicine, golf, music, art, architecture, the drama, the cinema, the wireless, weather, chess, the sale-room, social life, each of these has one or more members of the staff specially devoted to it. The number of letters from correspondents received every day is so large that another member of the staff is exclusively occupied in sifting them, and the collection and composition of the obituary notices take the whole time of another. More than forty writers and subsidiary editors are thus regularly employed.

Then come the various editorial departments. The department of Home News Editors, who collect, and of the reporters who contribute, the news of the day in this country, numbers fifteen persons, not counting their clerical assistants. The Parliamentary staff, which reports the debates, numbers twelve. The sporting room takes six men; the City Office nine; shipping three; the law reports four; the maps four; and the illustrations twenty-five; and in what is known as the Intelligence Department thirteen people are continuously busy collecting and filing information and answering innumerable demands for it.

Besides all these, there is the Foreign Department. In the London Office there is a large editorial staff concerned with foreign affairs, as well as a news section. Foreign correspondents are posted abroad in every country of the world. The principal offices outside London are, of course, in Paris, Berlin, Rome, New York, and Washington, but special attention is paid to news services throughout the Empire, and it can be said that representatives of *The Times* are posted in every city of importance. And these by no means exhaust the number of persons from whom *The Times* daily gathers news and views. There is a *Times* correspondent in every large and small news centre in the British Isles. The news agencies pour information into the office. And outside contributors, not members of the staff, are encouraged to send their best work for consideration.

The News Editors' departments have so organized the various means of obtaining information, from a yak-caravan to aeroplanes and the long-distance telephone, that nothing happens in any part of the world without news of it quickly reaching Printing House-square. None of this news is wasted, because it all adds to the general knowledge upon which the paper bases its considered comments. But drastic means must be taken to select from it and compress it for publication.

Every afternoon the heads of the Editorial departments meet under the presidency of the Editor to decide how big the paper is to be (the Advertisement Department has some interest in that decision, since the proportion of advertisements must be in adjustment with the reading matter) and what is to go into it. Each department then prepares its quota; but the chief strain falls upon the sub-editors. Theirs is special and extremely difficult work. They prepare all "copy" for the printer, correct its mistakes, cut out its redundancies, and make it ship-shape for publication. No writer loves them, but nearly every writer has reason to be grateful to them. In *The Times* Office there are twelve sub-editors engaged upon home news and nine upon foreign news.

All these departments and persons work for *The Times* newspaper itself; but besides the paper there are the Supplements and other subsidiary publications. The Literary and Educational Supplements have each a staff of five; the Trade and Engineering Supplement has a staff of eight; the Weekly Edition of *The Times* a staff of four; and the department of Special Numbers has also its own staff. Including the many clerical assistants and messengers, the editorial staff of *The Times* amounts to more than 300 regular members, and this is but a small proportion of those whose work goes to that field of the great undertaking.

The Manager is responsible to the Board of Directors for all questions relating to finance, and is in charge of the printing, publishing, advertisement, and other departments connected with the business side. The printing staff is very large. In the composing room the day and night staffs of compositors, each under its overseer, with his deputy and assistants and the Fathers of the various Chapels, number more than 300. In the machine room, similarly headed, there are more than 100 men; in the foundry more than fifty; in the casting room more than thirty; and more than thirty are at work making the illustrations. A department of incalculable importance in every newspaper office, and in *The Times* more than any other, is that of the printer's readers. By day and night in Printing House-square there are some fifty readers, totalling, with their assistants, 130 in all, correcting proofs, which will be read twice or more again in the Editorial Department. The chief engineer and his assistants, the electricians, the men in the engineers' shop, and the labourers, the cleaners, firemen, and all the others employed in what is tantamount to a very large factory, bring the mechanical staff up to more than 800 people.

The Advertisement Department employs nearly 100 members of the staff; and important among these are the scrutineers, who examine every advertisement offered to see that nothing shall be accepted which savours of impropriety, or is libellous, or tends to the discredit of any person or company; and the experts who are ready to give advice to all would-be advertisers on the most effective way of attracting attention.

In the publishing office more than 100 people are hard at work all night packing and dispatching copies of the paper as fast as they come from the great presses.

Taken all in all, every one from the Editor to the youngest of the messengers, the staff at Printing House-square numbers well over 1,500 people.

PRINTING "THE TIMES"

The mechanical departments at Printing House-square, the birthplace and home of *The Times*, have passed through all the stages of development of the newspaper printing industry. Since its foundation in 1785 its proprietors have ever taken a leading part in developing and originating methods and machinery, and have cradled and brought to maturity within its own walls most of the mechanical devices which go to the production and printing of the modern newspaper. To-day, after nearly 150 years, Printing House-square is a unique example of one of the oldest, yet one of the most modern, newspaper offices in the world.

If environment, tradition, and heredity count for anything, it is fitting that a great newspaper such as *The Times* should be printed and published in Printing House-square. It has been a home of printing since the Great Fire of London. The site on which the present buildings stand recalls many stirring episodes in English history, and although the midnight roar of modern machinery has succeeded the silence of the monastery, the visitor can still see many beautiful examples of the old foundations and walls and other relics of the past.

In printing and publishing *The Times* the method of procedure of the whole staff, and each member of it, has been so ordered as to secure efficiency and economy of time; and the system is continually being revised to bring it into line with ever-changing conditions. In this article it is intended to give only a brief description of the mechanical processes associated with the composing and printing of the paper from the moment when the original manuscript, or "copy," prepared in the editorial and advertisement departments, is received in the composing room.

The copy is dispatched by pneumatic carriers from the editorial departments to the "copy" desk in the composing room, entered in the Printer's list, and estimated as to the number of lines it will make according to the size of type in which it is to be composed. In the "make-up" of the paper the Printer is guided by a miniature copy, planned in advance and approved by the Editor, on each page of which the space allotted to news, articles, and advertisements is marked in the order in which they are intended to appear in the printed paper. The copy is sorted at the Printer's desk and given out to compositors to be set on the composing machines. The mechanical means of casting and setting type in *The Times* Office are of two kinds—the Monotype, which casts individual letters and characters and delivers them line by line, and the slug machine, which composes and casts the line in one solid piece.

One-third of the machines are Monotype and two-thirds slug—Linotype and Intertype. A small proportion of special matter is set by hand. *The Times* is set up on thirty-six slug machines, two of which cast headlines only. For the Monotype installation there are sixteen keyboards and twenty-two casters. Two casters also are continuously employed in casting sorts—*i.e.*, type of different characters and sizes used in corrections and display. The necessary spacing material is cast on two special machines. The composing room also contains three page, two treble-galley, and nine double-galley proof presses.

The type lines, after being set and cast by the various machines, are collected on galleys and passed to central randoms, examined, have headlines dropped in, and also a rack number to identify them. After proofs have been pulled from them they are placed in numbered racks ready for the corrector, who gets the first proof from the reading room, where all proofs are compared with the original copy.

Beyond the composing machines, and in the natural flow of material, is a quadrangle of iron assembling tables with numbered and descriptive racks below, and into these racks all the corrected matter is placed. On these assembling tables the corrected matter is made up into columns—news, articles, and advertisements being fitted into their appointed place according to the page plans. The blocks—that is, the etched zinc plates mounted on metal to bring them to the same height as the type—are inset, and the whole column is then gauged for length, and within small limits is corrected by adding or subtracting the necessary spacing material, making it exactly to the length required to lock up with an even pressure in the chase. Having satisfied himself on this point, the maker-up deposits the column in its galley on to the imposing tables, which are next to the assembling tables. When the exact number of completed columns for each page are ready they are taken in hand by the imposer, whose duty it is to make up the page. When the metal is assembled to form a page, and the column rules, the page number, and the heading and date line inserted, it is ready for the chase, which is a heavy steel frame fitted with sliding steel wedges. The chase is placed round the page of type, and the steel wedges are inserted and tightened up by end screws until the whole of the assembled matter is held tightly in place.

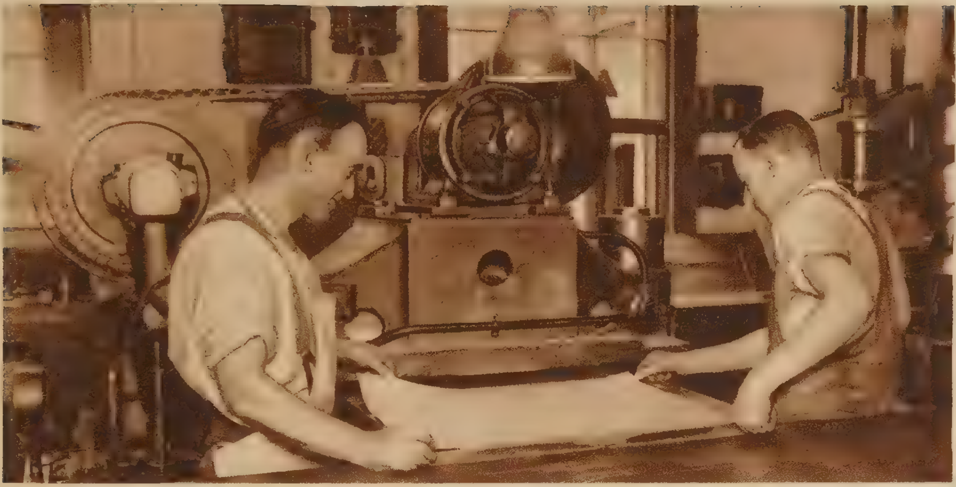
The chase of metal, now called a forme, is next slid on to a page-proofing press. Several copies are pulled for the reading room and editorial offices, but the first is handed to the Printer, who scans and approves or corrects. The forme is then pushed through an opening in the wall through which the imposing tables are continued into the foundry.

The continuation of the imposing tables in the upper foundry, the next stage of the mechanical production of the paper, is long and branching, enabling the formes to be fed to and from the platen presses and to pass each other when necessary. The forme is received in the foundry by the moulders, who first wash it free from the ink which has been applied to pull the page proof, and then spread on it a soft paper composition called a flong. This in turn is covered with several layers of felt blanket, and the whole is then pushed under a platen press, the table of which is a hollow chamber containing steam of 100lb. pressure, while the upper part, which descends, is a rigid table of metal, and the two come together, some by means of compressed air and others by hydraulic pressure. In one of the latest models steam is superseded by electric heating, and the upper plate is held rigid while the lower one rises; but all perform the same function, which is to compress the flong until its face takes in the impression of the type and pictures arranged in the forme and to bake and dry it while in contact. After several minutes the flong is sufficiently hard and dry, and the pressure is released. The flong, now called a matrix, is then stripped off the face of the forme. It has become a hard, dry mould of every character on the page and can be used to produce a number of duplicate stereo-plates. The forme of type, having completed its work, is returned to the composing room to be remodelled for later news or put on one side ready to be broken up next day. The mould is now sent to the foundry casting department, where, after being cut to size, it is slightly curved by hand and finished drying and curving in a roaster, which is a wire cage either whirling or stationary and heated by gas or electricity. The mould, now dry and hard and curved, but quite flexible, is placed and locked in the concave of one of the autoplate casting machines. By the movement of a lever the concave is brought into position and locked and sealed to a cylinder, and molten stereotyping metal is pumped into the cavity between them, forming when cool a half-circular stereoplate having on its outer face a replica in relief of the metal in the original forme. The concave is now drawn back, leaving the plate on the cylinder, which by engaging a clutch is rotated in a half-circle, in the course of which a saw engages to cut off the tail or surplus metal pumped in. The other half of the cylinder is now presented to the concave, which is again brought up, kicking off the finished plate and locking the machine ready for casting another. There are four of these autoplates, each of which casts at the rate of approximately three plates a minute.

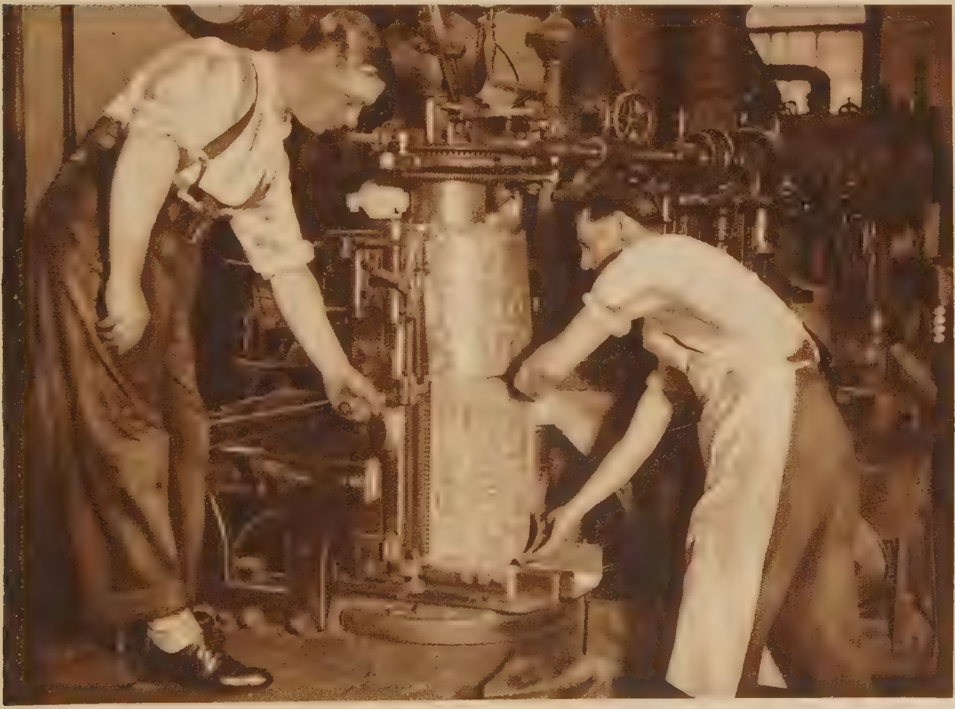
The plate, after being lifted from the casting machine, is examined, and to give it a true bearing on the printing cylinder is passed through an autoshaver, in which the projecting ribs on the inner curved surface are shaved by a rotating knife. The plate then passes on automatically, pausing for a few seconds while water is sprayed on the inner shaved surface to cool it, and again automatically passes over brushes which dry it and sweep away any metal adhering from the shaving process. It is now taken from the machine, placed in an electric lift, and sent to the press room.

The rotary printing plant consists of seven double-width octuple presses, all electrically driven, five by double motors and two by single motors, each main-drive motor in turn controlled by a slow-motion motor to enable the printing press to creep up gradually until it attains full speed, and also to bring it to rest again. The whole operation is done by inching and push-button control. The reels of paper are fed to the presses by means of electric hoists, and the ink is pumped from supply tanks to the receivers of the inking mechanism by rotary pumps.

The size of *The Times* may vary from day to day, though in the busy season its full size of thirty-two pages is fairly constant. When the pressmen arrive at 10.30 p.m. their first duty, therefore, is to ascertain what the size of the paper for the following morning is to be. They then load the presses with reels of paper of the required width, and lead the webs through the press to the folder. By the time the web is through the presses the plates for the early pages have begun to arrive from the



The flong being placed in position on the forme preparatory to going under the moulding press.



Another photograph taken in the stereotyping department of *The Times*. Removing the plate from the casting machine.

Placing the stereo plate on the Autoshaver, a finishing machine.

The finished plate ready to be placed on the printing press.

Parcels of *The Times* being placed in motor vans in Printing House Square, for despatch to the London Railway Termini.

foundry. These are put on as quickly as they come down, and in the waiting intervals the press is slowly turned to get the ink on to plates already on, and to proof as far as possible the copy for imposition. When the last two plates arrive, forming the last page—for at each revolution of the press cylinders two copies are produced—they are quickly slipped on and locked, the "all clear" is given, and the press slowly revolves, gathering speed until complete copies are printed. The operator provides the pressmen, editors, proof-readers, and composing room overseers with the first copies printed, which are keenly scrutinized in all departments. In the meantime the pressmen make any slight adjustment to the ink supply and cylinder impression that may be necessary.

By this time the checked copies are returned to the operator. If there are faults that he can remedy, he does so. If there is none, the "right away" is signalled, and in a few seconds complete copies of *The Times* are pouring from the folder in a continuous stream. All early copies are thrown to waste and the good copies, mechanically counted in quires, are quickly conveyed to the publishing room. As all presses are standing waiting for the last plates, only a few seconds elapse until these also are in motion, and in a very short period they are all printing to full capacity.

The whole issue is divided generally into three parts, a country edition and a series of London editions, and during the running of each the type pages are being constantly altered, so that the Late London Edition contains the latest news and pictures of interest up to 2 a.m., and sometimes a much later hour if events of world-wide importance have taken place.

The publisher's men have meanwhile been preparing labels, cover-paper, and stamped wrappers for post copies. The first bundles go to the early trains about 11.55 p.m., the next to the men putting post wrappers on, and afterwards the early agents are supplied. The motor lorries and cars are grouped in Playhouse-yard and in Printing House-square, and almost before the last knot is tied the bundle is on its way to one of the great London termini.

The publishing and circulation departments are models of organization, which must needs be when, in addition to the large parcels issued to wholesale agents, there are thousands of smaller parcels dispatched for distribution at home and abroad. The organization that successfully produces a great modern newspaper must work and think with precision, for a lapse of memory or a clumsy movement may deprive the publisher of the few precious minutes so necessary to enable *The Times* to reach the reader at the earliest possible moment.

In addition to the ordinary paper, there is printed every morning a certain number of copies called the Royal Edition on paper specially made to resist the decay caused by time and having a life of several hundreds of years. Two copies of this edition are sent to the King every morning wherever he is in residence, the farther from his Capital the swifter the means of transport.

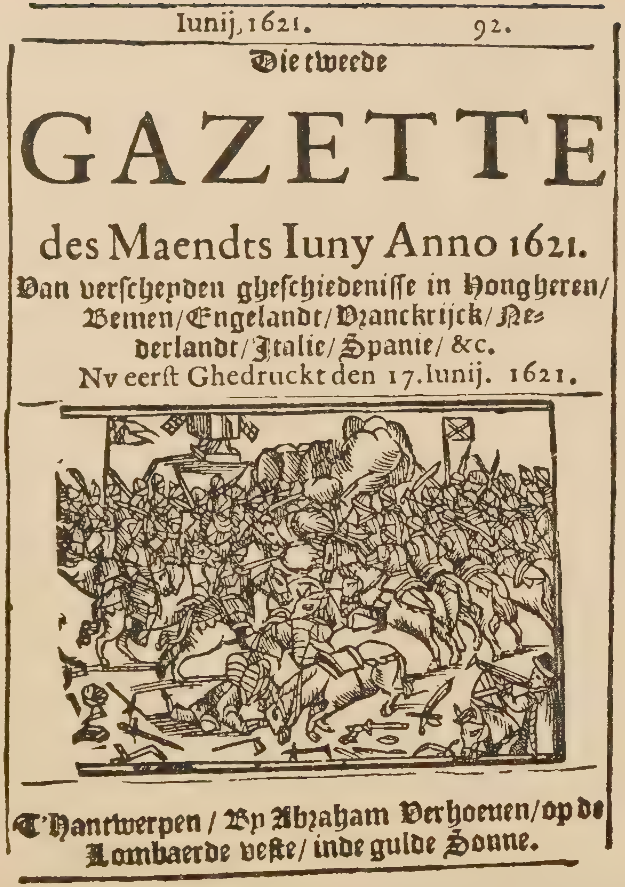
Many other branches and departments, both large and small, complete the organization of *The Times* printing works. The half-tone and line blocks for illustrations are all made in the office, and the paper relies mainly on its own staff of photographers for its Picture Page subjects. The system behind the obituary notices is among the most perfect and largest of any newspaper office in the world. The department for printing posters, ordinary or illustrated, is in itself a model of efficiency. The subscription department checks the addresses and prints the wrappers for thousands of postal subscribers to *The Times* and its subsidiary publications, which consist of *The Times Weekly Edition*, *The Times Literary Supplement*, *The Times Trade and Engineering Supplement*, and *The Times Educational Supplement*, besides the special numbers issued at intervals during the year.

There are also departments for printing and publishing *The Times* Law Reports, *The Times* Index, Prospectuses of Public Companies, Commercial Cases, and Company Meetings, together with the issue in pamphlet or book form—at the request of readers—of special articles and leaders on innumerable subjects which have appeared in the paper.

CHAPTER II

ILLUSTRATION OF NEWSPAPERS FROM WOODCUT TO WIRELESS

The earliest pictures used for the purpose of illustrating topical events and news subjects are those to be found among the tracts, broadsides, and pamphlets of the seventeenth century. They were usually crude woodcuts, but occasionally copper engravings. The first Mercuries, published at the beginning of the Civil War, are illustrated with woodcut portraits. Abraham Verhoeven, an Antwerp printer, gives us the first pictures which might be described as newspaper illustrations in the *Gazette of Antwerp*, first published in 1619. These are woodcuts, and examples may be seen in a number of copies printed in following years. The subjects were usually military—siege and battle scenes, with an occasional picture of a person being hanged or beheaded. This paper was published continuously for over twenty years, but many of the blocks were used over and over again to illustrate similar events, so that they cannot be taken very seriously, except that they give some idea of costume and custom. A news-pamphlet published in London in 1632, *The Swedish Intelligencer*, contains a few illustrations of the campaigns in which Gustavus Adolphus II. was engaged. These are mostly battle scenes engraved on copper, of much better quality than the Antwerp woodcuts. Numerous examples might be given of pictures illustrating topical events, but they nearly all occur in odd papers or broadsides, or those which were published at irregular intervals to chronicle very unusual happenings. The slow growth of newspaper production and the few illustrations were partly due to the censorship and partly to the unsettled state of the country. The small section of the population which could read and write relied on the newsletter. The Plague and Fire of London also put most of the London printers out of action and retarded work for many years. There are few contemporary pictures of either. One tract published in 1665, called "London's Lord have



Iunij,1621. 92.

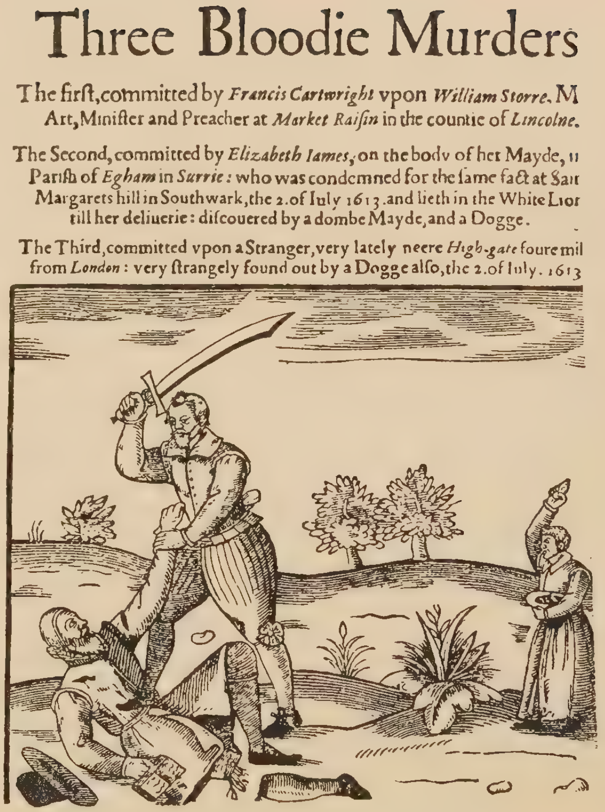
Die tweede

GAZETTE

des Maendts Iuny Anno 1621.

Van verſchepden gheſchiedeniſſe in Hongheren/
Bemen/Engelandt/Vranckrijck/Ne-
derlandt/Italie/Spanie/ &c.
Nv eerſt Ghedruckt den 17.Iunij. 1621.

T'Hantwerpen / By Abraham Verhoeven/op de
Lombaerde veſte/ inde gulde Sonne.



Three Bloodie Murders

The firſt,committed by *Francis Cartwright* vpon *William Storre*, M
Art,Miniſter and Preacher at *Market Raiſin* in the countie of *Lincolne*.

The Second, committed by *Elizabeth Iames*, on the body of her Mayde, 11
Pariſh of *Egham* in *Surrie*: who was condemned for the ſame fact at Sair
Margarets hill in Southwark, the 2. of Iuly 1613. and lieth in the White Lior
till her deliuerie: diſcouered by a dombe Mayde, and a Dogge.

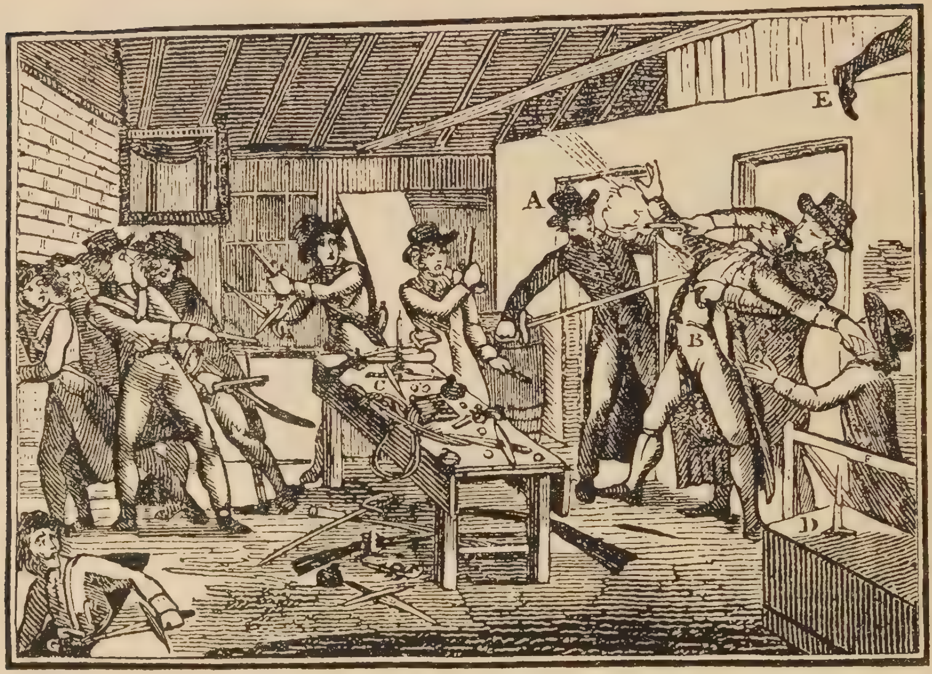
The Third, committed vpon a Stranger, very lately neere *High-gate* foure mil
from *London*: very ſtrangely found out by a Dogge alſo, the 2. of Iuly. 1613

Two seventeenth-century woodcuts illustrating topical news. The first is from the *Gazette of Antwerp* of June 17, 1621. The Gazette was one of the earliest newspapers to be continuously published. The second is from a pamphlet published in 1613.

mercy upon us,'' has a crude woodcut showing burials of Plague victims taking place, with the walls of the City in the background.

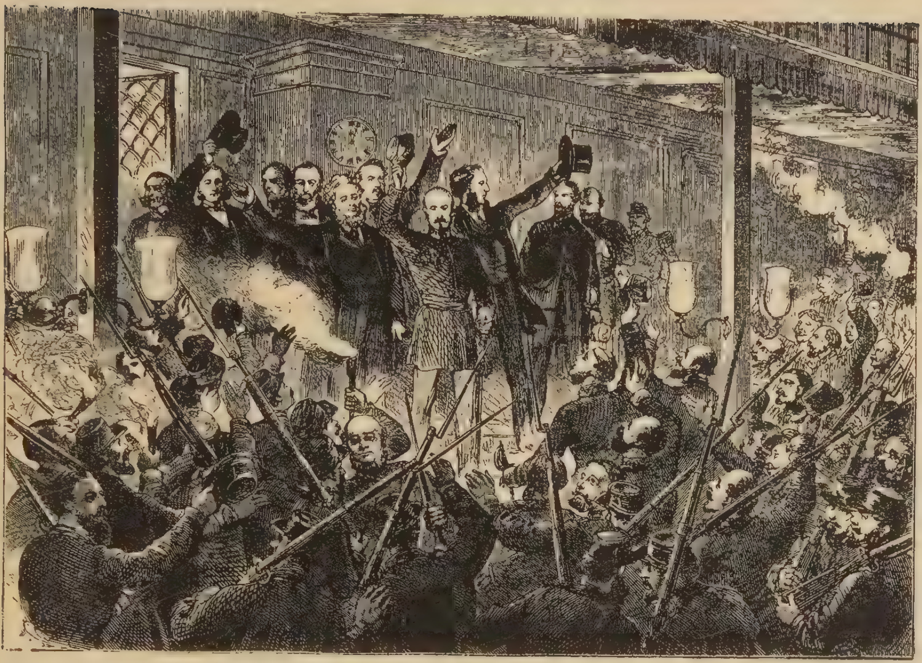
Newspaper illustrations as we see them to-day are a comparatively recent development. Before 1890 there were no daily newspapers illustrated with the photographic half-tone blocks which are in universal use to-day. Those papers which printed pictures still relied on the old wood block. But the style of work had altered and the craftsmanship had improved, perhaps not always from an artistic point of view, but certainly in illustrating topical events. The improvement dates from the days of Thomas Bewick, 1753-1828. Bewick altered the technique of wood-engraving and revived it as an art. His method, known as white line, was adopted by many of the engravers who followed him, but as newspaper illustrations became more numerous a lighter style was evolved. Usually the original picture was redrawn or traced on to the surface of the wood block, ready for the engraver. Some years before the introduction of the half-tone block an advance was made by putting a photographic image on instead, either a copy of a drawing or an original photograph. This not only saved time, but direct photographs of places or portraits were used, and after being engraved gave a much more realistic picture. When sent out to illustrate the news the artist made quick sketches, making the finished drawing in the newspaper office on his return. Sketches sent from a distance or from abroad were finished or redrawn by a staff artist or sometimes one of the wood-engravers. Examples of these illustrations may be seen in copies of the *Illustrated London News* published during the Franco-Prussian War. This paper, started in 1842 by William Ingram, was the first picture newspaper. At the end of the nineteenth century, when these methods were in general use, sketches and blocks were turned out very quickly. Where the illustration to be reproduced was much larger than usual, the wood block was built up of sections and the picture placed on the surface; the block was then divided and the sections given out to different artists to engrave. When each part had been finished the pieces were reassembled and the whole bolted together. Before the block was passed for printing an engraver went over it, taking out the slight marks left by the joints.

The introduction of line and half-tone blocks slowly but surely revolutionized the old methods which had been in use since the days of the first broadsheets. In 1890 the *Daily Graphic*, the first daily picture newspaper, was founded by Mr. W. L. Thomas, who about twenty years earlier had started the weekly *Graphic*. The daily paper at first used



A woodcut published in the *Observer* in 1820. It represents the murder of Police-officer Smithers by Arthur Thistlewood, the leader of the Cato-street Conspiracy.

wood blocks, but line blocks were soon introduced, particularly for portraits, and later half-tone blocks. The first half-tones were made by the Meisenbach process, invented in 1882. By this method the original picture was photographed through a screen of very fine lines, which broke it up into a pattern of dots. This screen was formed of lines running in one direction, and was reversed to obtain the cross line. The negative was printed on to a piece of zinc or copper and etched with acid in a manner similar to that at present in use, the picture left in relief thus forming the printing surface. Photo-mechanical reproduction saved a considerable amount of time and enabled photographic portraits to be used which gave lifelike results. Meisenbach may be described as the pioneer of commercial half-tone reproduction. He made blocks for several London newspapers, but his process was soon improved upon, first by Ives, who made the first cross-line screen, and later by the invention of the Levy cross-line screen, which, being



A wood-engraving from the *Illustrated London News* of 1870. This shows the National Guards cheering the Provisional Government, and was taken from a sketch sent by balloon post from Paris during the siege.

mechanically ruled, allowed a finer half-tone block to be reproduced, formed in the same way of a number of small dots, ranging from pin-points in the high-lights of the picture to nearly black squares in the shadows, similar to those we see in our newspapers to-day.

When photo-mechanical methods were first introduced the line block came into general use for making direct reproductions of pen-and-ink drawings. It was quickly made, and printed easily and clearly on almost any kind of paper. An early example in news illustration is a line portrait of Lefroy the murderer printed in the *Daily Telegraph* in 1881. The earlier half-tones were usually on the flat side; some time had to be spent in hand-engraving them to obtain sufficient contrast. Also there was considerable difficulty in printing them on the existing machinery. The paper, too, was usually unsatisfactory. In spite of these handicaps, the half-tone block became firmly established, and by 1900 several weekly newspapers had adopted the new way of reproducing illustrations. In a few years some of the London dailies and the more important provincial daily papers were printing half-tone illustrations. From that time it has only been a question of improvement. The same process is in use to-day in every quarter of the globe. It is unlikely that it will be superseded for daily newspaper printing for some time, as it is the one process which allows illustrations to be stereotyped and printed in quickly and uniformly with the ordinary type on the rotary letterpress printing machine.

Efforts have been made to harness other processes to the daily newspaper press, but either the time of preparation or the uncertainty of results has so far prevented their adoption. Most newspapers to-day have their staff photographers, who, like the reporters, go out to record the day's news. They must be trained to photograph any variety of subject and to go anywhere at home or abroad at a moment's notice. Their duties are varied and include photographing public functions, military and naval spectacles, sporting events, important personages, buildings (inside and out), copying pictures and documents; and whatever the subject the photographer must arrange or compose it to the best advantage in the time available. Until a few years ago the only methods of dispatching important pictures to a newspaper were by post, train, and, occasionally, by motor-car. But now every picture of importance is rushed off by car, train, or aeroplane, or by the use of all three. Many papers have their own electrical transmission apparatus which receives and transmits pictures from abroad and at home, both by wire and wireless. Scotland, which used to be nine hours away from London pictorially, is now less than nine minutes, for pictures are regularly transmitted between the two countries at all hours. At present there is some limit to the size of pictures transmitted, and there is also some loss of detail, but these defects will probably be remedied very soon. We have now arrived at a stage where a whole paper can be telegraphed—text, pictures, and advertisements in facsimile, but perhaps not yet perfectly—from one city to another. Fair results are obtained by wireless, but certain difficulties have to be overcome before the results can compare satisfactorily with telegraphed pictures.

U. V. B.

CHAPTER III

WEEKLY JOURNALS AND MAGAZINES

A VAST INDUSTRY

The advance in education during the last few generations has created a demand among the masses for a type of literature both wide and varied in its appeal. This demand presents a scope for light and entertaining fiction, including magazines containing concise and enlightened articles dealing with topical, political, or sporting subjects, as well as educational and instructional works. These tastes are admirably provided for by the weekly periodicals, serial publications, and magazines which are produced by a highly specialized section of the printing industry—namely, the periodical press.

The growth of the demand for light reading among the public has therefore brought about a steady evolution of the printing industry. Comparatively few years ago many printing firms practised all the various arts and crafts of the trade under one roof, but the necessity of meeting the public demand has resulted in the establishment of at least three distinct types of printing businesses—namely, newspaper printing, magazine and periodical printing, and general printing—each business being highly specialized in its own particular sphere. One of the greatest pioneers of the periodical press was the late Lord Northcliffe, who some forty years ago embarked upon his first venture in this field with *Answers*, which even to this day remains one of the most popular and successful weekly publications on the market. From this small beginning many other famous journals have become firmly established throughout this country and in the Dominions. Vast sums of capital are now invested in plant and buildings used for the production of the many millions of publications distributed throughout the country.

The economic production as well as the publishing and selling of these magazines calls for much forethought and experience. This is more especially the case at the present time, partly owing to the high standard of wages which prevails in the craft to-day, and also to the long periods of apprenticeship required and the skill and craftsmanship necessary in this important field of industry. A most elaborate organization is essential for the production of these publications from the time the original photographs and "copy" reach the printers to the moment when they are placed on sale. Consider briefly the amount of detail work involved. The editorial staff is engaged upon the choice and arrangement of manuscripts, and in collaboration with the advertising manager allocates the space in the magazines which shall be allotted to fiction, articles, and advertisements respectively. As a rule "copy," or the manuscript of the reading matter, is sent in on a given day (some latitude being allowed in the case of the advertisement supplements), but the whole publication must be passed for press at a given time on a specified day of each week. It will astonish many readers to learn that one firm of periodical printers have one of their publications being passed for press every twenty minutes of the working day. This firm employ in their printing works alone about 3,000 workpeople, and the wages bill amounts to over three-quarters of a million pounds sterling per annum.

After the editor has passed his proofs for press, final corrections are made by the compositor, and the formes are then sent to the foundry department, where papier-mâché moulds or impressions of the type face are taken, prior to the curved stereoplates being made. The printing of periodicals from curved stereotype plates is the chief method still employed in the production of these publications, although other processes are rapidly coming to the fore and are being continually investigated by the keen and up-to-date printer.

To facilitate the economical production of these periodicals great strides have been made in the provision and improvement of automatic or mechanical type-setting machinery. These machines have, indeed, been brought to such a state of perfection that not only is ordinary text matter set or composed at a high speed, but displayed advertisements also are set by these means. It therefore follows that mechanical appliances must be utilized to the utmost extent possible in order that the huge public demand for cheap printing can be met.

One firm which specializes in periodical printing employs no fewer than ninety type-setting machines of various makes and descriptions. These machines are engaged upon the composition of the manuscripts and advertisements comprising the fifty-nine publications which the firm issues each week.

The printing machines used in their works are marvels of engineering science and ingenuity, and upon them publications consisting of text and cover (the latter printed in two or more colours) are printed, folded, stitched and cut, and delivered ready for distribution to bookstalls and newsagents. These machines are able to produce complete magazines and periodicals at the rate of over 20,000 copies per hour. Other marvellous machines are available for the printing of coloured comic papers. These machines are capable of printing up to six colours simultaneously in perfect register, the copies being folded, delivered, and counted in quires also at the high speed of 20,000 copies per hour.

A glance at the publications on the bookstalls will give some idea of the efforts of the publishing world to meet the ever-increasing demands of the public. The weekly periodicals and magazines have enormous circulations, amounting in the aggregate to many millions. The company previously referred to prints and publishes about 9,000,000 copies of its publications every week. These huge circulations, spread over many publications, form very remunerative media for the merchants and traders of the country, appealing to all classes of the community. Advertisers, by the wide choice of periodicals available, are able to bring their wares to the notice of those for whom their goods are especially suited.

A survey of the progress in periodical printing during the last quarter of a century shows that there has been a growing demand for what may be termed pictorial reading. This is reflected in the many attractive illustrated publications now appearing on the market, which are evidence of the tendency of the modern trend of literature. The majority are, of course, printed by the letterpress method, but other processes are in being, and are making headway, which in time will doubtless prove serious rivals to the present letterpress methods. The photogravure or intaglio process is particularly worthy of mention. A number of periodicals are already on the market which are printed entirely by this method, and very artistic reproductions, impossible to be obtained by the letterpress process, are achieved.

Another method which is surely commending itself to the progressive printer is the litho-offset process. Although neither of these processes has yet succeeded in making a definite appeal to either the reading or advertising public, nevertheless the time will come when their attractiveness and advantages will be recognized, and great strides will of necessity then take place in the printing industry generally. The installation of speedy and labour-saving machinery is a *sine qua non* of the printing industry, and the printer is fully alive to the importance of keeping in close touch with the latest inventions and improvements pertaining to his trade.

The publishing and dispatching of these huge stocks of printed matter is in itself a gigantic undertaking. All kinds of transport are brought into operation. Large consignments are sent by rail, road, or steamer to various centres, from which they are redistributed among the retailers. Every newsagent and bookstall throughout the country must receive supplies of books in ample time to provide for the sale of a particular book or periodical simultaneously throughout the length and breadth of the land.

PART VII

GENERAL PRINTING

CHAPTER I

COMMERCIAL PRINTING

THE STIMULUS OF NEW IDEAS

The printing which is produced to stimulate trade, whether in the form of announcements or wrappings, is a department of the printer's craft that calls for more thought in its preparation, more invention and greater care in the selection of materials, than any other. It is now commonly called "commercial printing." We have no clearer designation for it. It is a term that is wide in its meaning and embraces every kind of printing that is used by the manufacturer and merchant of to-day in the marketing of goods. During the passing of the last fifteen years it has become a very considerable part of the whole printing trade of this country. It has given a stimulus to the trades that are allied to it and has reacted upon the older and more sedate art of the book-printer because of its eagerness to experiment and to receive new ideas in format, types, and reproductive processes. At times it may have been too receptive and may have encouraged that which was no more than mere novelty, forms having no intrinsic beauty or materials that were used with too little regard for their fitness. Yet, on the whole, it has been good to have the challenge to tradition and time-staled custom. It has made printing, as a craft and as a business, bestir itself.

It is in the search for new forms that the most significant advance has been made. To serve fully the needs of the advertiser and distributor to-day it is necessary to maintain a spirit of youthfulness and adventure in both design and production. Never has there been a readier reception of new ideas than there is at the present time, though perhaps there has never been a more searching scrutiny of the merits of the newcomer.

In the field of design the quality that has established itself as one of supreme value is that of simplicity. Whatever the subject may be, it is this directness of statement, an intelligent economy of means, that has revitalized the art of commercial printing. It is seen in the design of type, in the decoration of a page, and in the rendering of natural objects. In type it has reached what may well seem to be the last possible stage of the eradication of the non-essential. In the delineation of the human figure or of landscape it has reduced form to the most severe symbol. And it is in this extreme simplicity that the designer is finding a more forceful clarity of expression and is able to arrest attention more certainly than with elaboration or with subtlety of form and colour.

It may be assumed that most of the printing that is produced for the purpose of advertisement is devised to gain the attention of the inattentive or the hurried. Only in those cases where information is to be conveyed with completeness, where it is necessary to describe an article or a service at length, is it expedient to discard brevity or illustrate with full detail. The design of printing has become not only more efficient as a selling force during the post-War years because of this directness of appeal, but it has become more entertaining. It has shown a discontent with the formal announcements of trade, with unimaginative specifications, and with dull reiterations of benefits offered by the maker or retailer of wares. It aims at diverting a jaded public, and will often achieve with a jest what it would fail to get with a solemn bid for attention.

Advertising to-day begins with the first announcement of a commodity, but it continues until that commodity is in the buyer's hands. It runs through the whole process from the showcard or leaflet to the label and outer wrapping. And all the time it must be distinctive to be efficient. It is in the fuller understanding of salesmanship as an art in itself that the designer of printing has made the most pronounced advance in recent years. And it is in this element of successful design that the craft of commercial printing differs from all other forms of printing. It is created to serve a definite purpose and does not stand or fall because of its intrinsic æsthetic qualities. It may have beauty, but that alone is not enough. Neither is it sufficient that it possess selling power with lack of beauty. There should be both in well-proportioned combination. The developments that have been made in processes of reproduction have strengthened the hand of the commercial printer and have made it possible for him to reproduce with the utmost faithfulness the work of the artist and to present the goods of the advertiser with exact precision. The coming of direct colour photography has removed a barrier between the manufacturer and the purchaser—it is almost as though one saw the goods themselves on the catalogue page. Processes of printing have allowed the printer to use paper that has an agreeable surface and texture. Colour is appreciated, and ink-makers have progressed no less surely than the others who have contributed to the advancement of the craft of commercial printing.

In comparison with the work of other countries, it need not be felt that we are wanting in either inventiveness or artistic perception. It is more evident each year that design and craftsmanship in printing are stirring an increasing interest, and a larger amount of intelligent thought is being directed to their development. In the schools and workshops more attention is being given to the subject of design and workmanship. In the windows of our shops and on the hoardings there is evidence of the growth of interest in this most vital art. Higher standards are accepted, and while there is still much that is commonplace, the sum of sound work increases. The tendency generally is towards more vivacity in both design and execution. There may be a leaning towards photographic actuality, but this is, perhaps, a natural outcome of the mechanical age in which we live. The cinema and the illustrated newspaper have their effect. The photograph is part of our language; it is part of our daily life. We expect it, and we accept it. It is a healthy servant of our civilization, and an invaluable one. Because of its assured hold upon us we turn to the creative arts with refreshed enthusiasm and realize that the one becomes strengthened by the other. Constituted as we are in this the third decade of the twentieth century, it is in the co-ordination of all our resources that we shall advance with the more certain steps to freedom of expression. The art of commercial printing reflects the life of to-day as surely as any other art reflects it.

R. P. G.

CHAPTER II

SALESMANSHIP

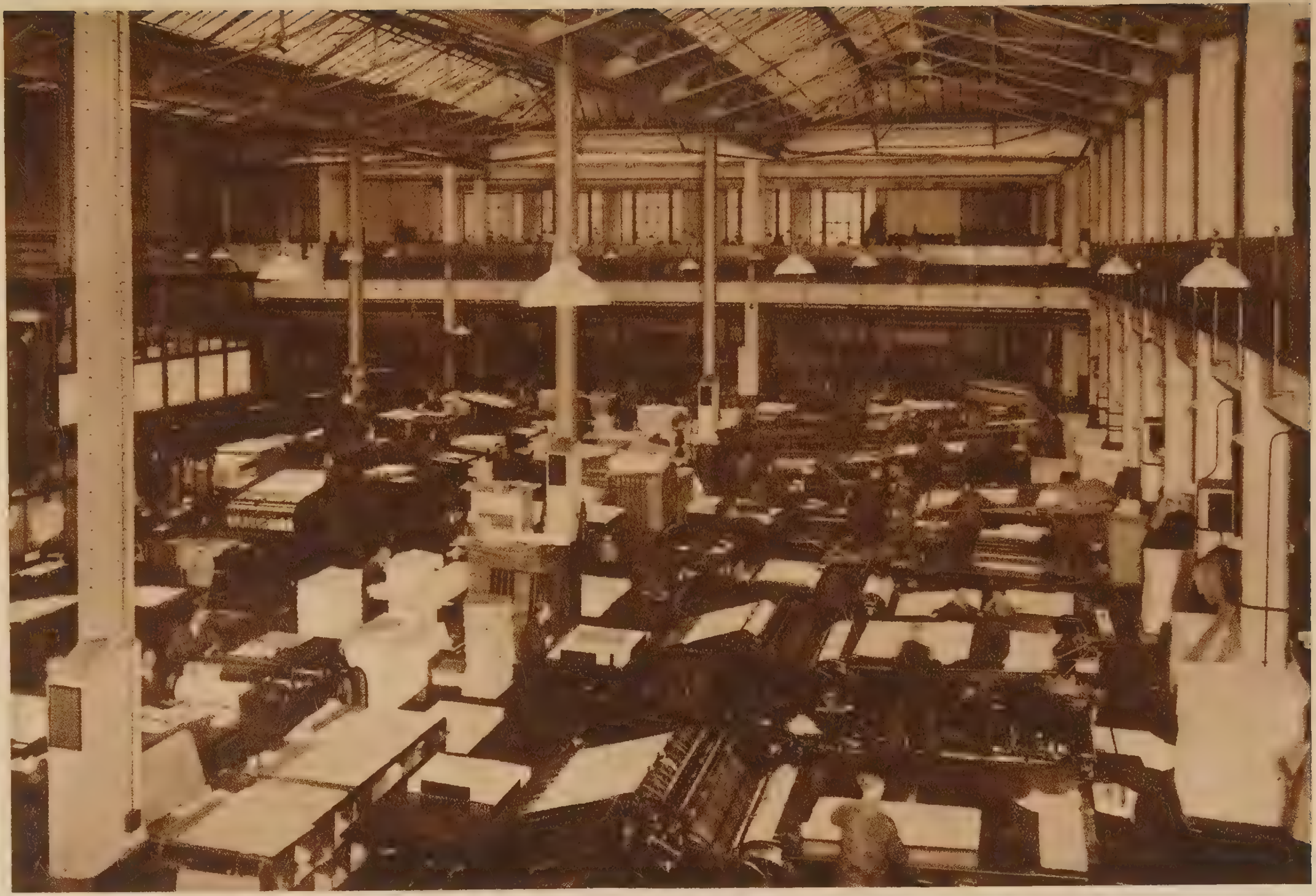
THE IMPORTANCE OF GOOD PRINTING

The word advertising is older by centuries than the thing it now represents. Any public inscription, from the Roman triumphal arch to the "Legal Notices" column of the daily paper, is an advertisement in that attention is adverted to some fact or object. Until hardly more than a generation ago, printed advertising consisted of announcements, modest or boastful, addressed to a known market. The science of salesmanship arrived when the seller began to create new wants and new markets; not merely to keep pace with the consumer, but to anticipate and stimulate him.

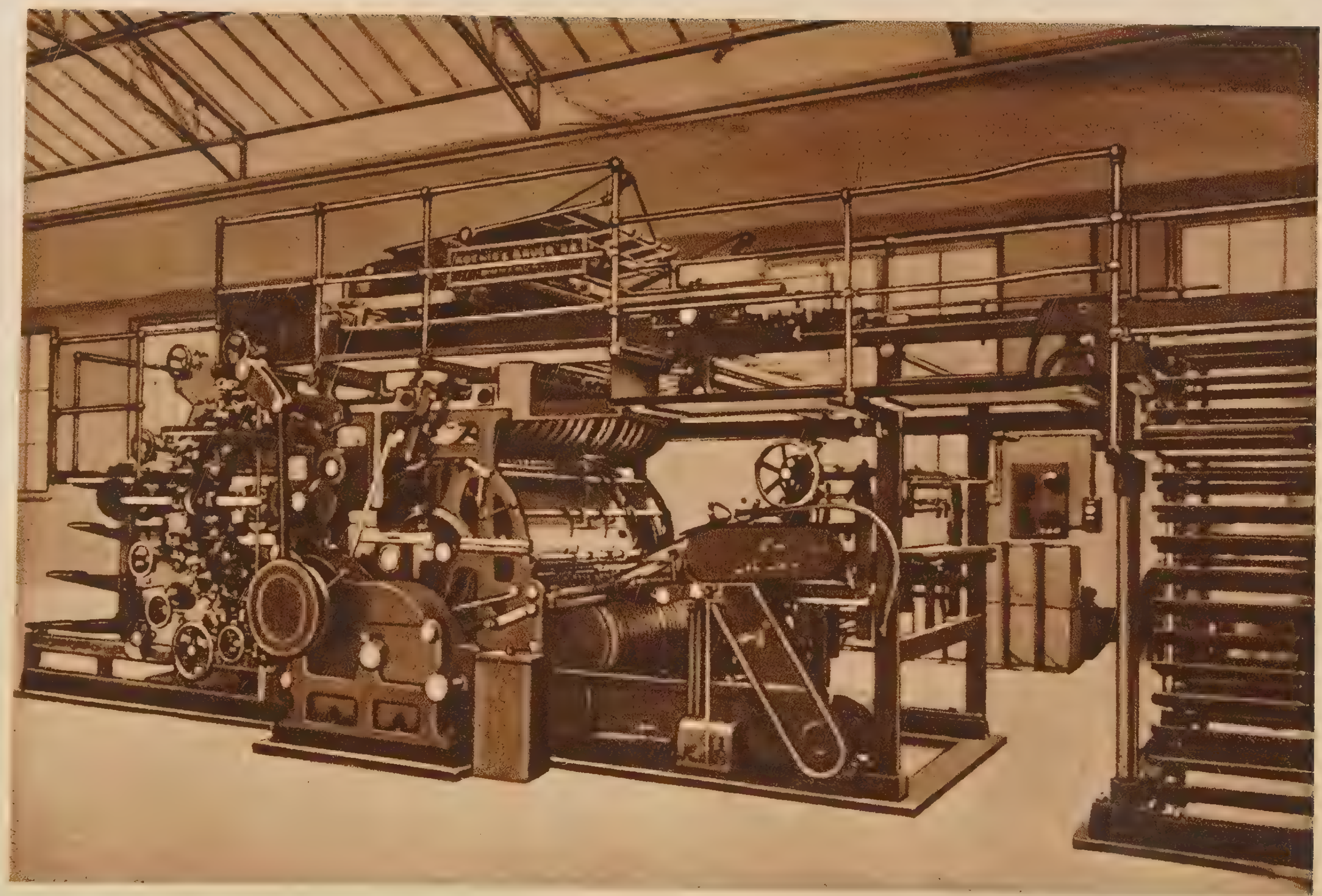
The salesman has come out from behind the counter and joined the board of directors of modern industry. There are few branches of human learning and activity which do not help him to know why people buy and how they can be made to buy more. And instead of taking an order from one customer at a time as a want is felt, he issues an order—a command to desire some new thing—to ten thousand people at a time. No group of human "representatives" can instil new wants into such a market. Printing must deputize.

Printing is a way of broadcasting thought. Its single weakness is that of the wireless: if our interest is not roused we can "switch off" our attention without seeming impolite. But once an argument is so presented that it can and must be read through, this very ignoring of interruptions becomes an asset. Good printed salesmanship is like a sound-picture of a good salesman's argument exhibited in a thousand places instead of one; it cannot meet, though it can forestall, an objection; but neither can it be heckled. It can cover a whole nation, and it can bring buyers to the point of action.

There are two kinds of printed salesmen—fixtures and travellers. Advertisements in periodicals belong in the first group. They are like stall-holders in a great bazaar which offers general entertainment to



The machinery hall in Messrs. W. H. Smith's printing works at Stamford Street, London. Covering a floor space of approximately 27,000 square feet, it is one of the largest machinery halls under one roof.



A four-colour sheet-fed rotary machine for colour work, from the works of Koenig and Bauer.
It is capable of printing 25 sheets a minute in four colours.

those who will pay the price of admission. Their life and chances of success are vastly enhanced by the prestige of the periodical. The printed traveller, on the other hand, walks in upon the prospective buyer without an introduction and uninvited. Unlike the magazine advertisement, it has no second chance for attention as pages are thumbed through again or the paper is handed on to someone else. Within two seconds its fate is decided once and for all. It is particularly important, therefore, that direct mail advertising—the printed traveller who goes to the breakfast table or desk under the guise of correspondence—should be able in these two seconds to gasp out its credentials so that it can deliver a complete argument. Once it has been able to do this, it has certain unique advantages as a salesman. It is not jostled by competing advertisements; it is obviously a personal message from a firm to one reader deliberately chosen from many; and it gives a particularly convenient opportunity for bringing in results through reply forms, cards, &c. And the sole test of excellence in any form of salesmanship is the resulting business.

Within the last few years direct mail advertising has assumed remarkable importance, first in America and more recently in Europe, because it offers a chance to address a picked group of people individually. Strictly speaking, the typewritten sales letter is a "printed" advertisement, and a most effective one. But printing to-day means reproducing, broadcasting, through type and the press. It is possible to reproduce a typewritten letter—or even a written post-card—thousands of times; but the impersonal quality of a reproduction never shows so clearly as when it attempts to masquerade as an original. Direct mail advertising finds a place for mimeographed letters; but the vast development which it has seen in the last few years has been in the line of clever and effectively printed folders, booklets, and all such items as calendars and blotters, which offer some useful return for the privilege of room on the buyer's desk. The direct mail advertisement, the printed traveller, can carry his sample case with him—and should do so. There are few commodities which cannot be alluringly shown by a photograph or sketch; and direct mail enables the advertiser to use, if he will, the finest four-colour reproductions, on suitable paper and apart from any rivals for attention. The silent salesman, again, can be as "well dressed" as the advertiser's own printer can make him. Clear presswork and sharp new type are to the folder what a clean shave is to the salesman; and the type-face itself is no less important than a human voice with a pleasant accent and a convincing timbre.

To England belongs much of the credit for the remarkable elevation of typographic standards in printed salesmanship which has come about since the War. The Westminster Press, indeed, had exerted considerable influence by 1914; and the Pelican Press, also of London, was by 1918 making advertising history, due to the conjunction of two stars now separately famous in the more august realm of book production—Mr. Francis Meynell and Mr. Stanley Morison. Old flower and woodcut borders were revived, new and ancient types acquired, sympathetic papers discovered. Despite the gay earnestness with which these pioneers made advertisements look as charming as possible, it would be wrong to assume that they were trying to make an art of printed advertising. The argument was rather—There are people in the world to whom beauty is a countersign, a search warrant to the mind; at present these people have a just contempt for vulgar and screaming advertisements; win their confidence and you have won a market in which there happens to be a high proportion of wealth. That the argument succeeded is proved by the existence to-day of the Pelican, Westminster, Curwen, and Baynard presses, with various others, all adepts in addressing the man of good taste in his own typographic language. Mr. Charles Bradley's good work with the Morland Press is being continued in his own Bradley Press, and Mr. Joseph Thorp (to whom, with Mr. Gerard Meynell, belongs most of the credit for first bringing intelligent typography to the service of advertisers) is still a designer of influence, though no longer connected with the Arden Press.

The creative side of direct advertising has not yet been taken out of the hands of the printer, as has newspaper advertising and book design. The local printer is still able to increase the business of manufacturers and retailers by sending intelligent printing through the post to a carefully chosen mailing list. He profits by his own technical knowledge. He knows, for example, that while bad illustrators are a liability and good illustrators few and expensive, photographs are not only economical but generally perfect salesmen. He can choose discreetly among typefaces. During the War, when European typefounders and composing machine makers were busy with grimmer work, the American typographic styles—based on the comfortably pseudo-classic faces of Mr. Frederic Goudy and on the rich Jensonian Cloister—powerfully affected our publicity. Now, however, the situation is being reversed, at least as regards display. German typefounders like Klingspor have taken the lead in creating display faces which interpret in turn every phase of modern interest. The latest vogue, for cool sans-serif types, derives from Mr. Edward Johnston's fine letter for the London Underground. It became a type fashion in Germany, was naturalized again in the equally fine type of Mr. Eric Gill, and is now spreading from England to America.

The printed salesman dressed in the rather opulent post-War American style ceases to produce the best results when people cease to respect antiquity as such and demand a new thing. But what applies to bold display lines does not apply to the argumentative text, which must convey an idea to the already captured attention. In 1922 our printers had very little choice among fine classic text types which could convey different "moods" without exoticism. But since that time the Lanston Monotype Corporation of London has come to the rescue with a series of over a dozen such faces for inexpensive mechanical production. A representative exhibition of modern British printed advertising could be compiled from work in only two faces, Monotype Baskerville and Plantin.

The printed salesman of the future will appear "in modern dress," as far as display and decoration go, just as long as modernity puts people in the mood to buy new things; it will be beautiful just as long as beauty loosens purse-strings; but when it comes down to presenting an argument it must still use the everyday language of the buyer, and use it without a stammer or a foreign accent.

CHAPTER III

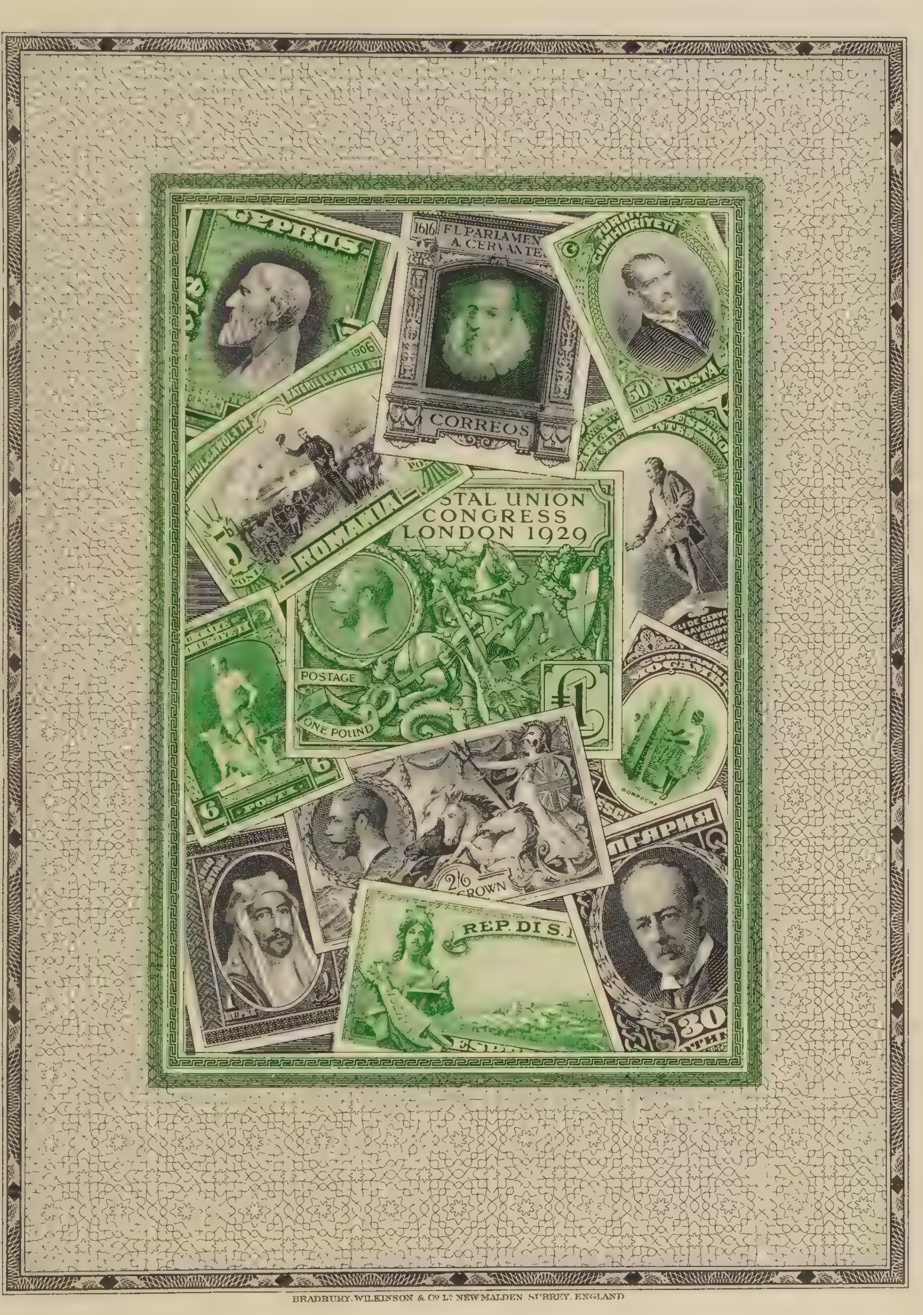
DIRECT PLATE PRINTING

BANK-NOTES AND STAMPS

Since the beginning of this century there has been a very wide growth in the circulation of paper money in Europe. In England the employment of £1 and 10s. notes, originally a War measure, has been found so much more convenient and cheaper than gold coinage that notes are now firmly established as a medium of currency. This expansion has given the forger a much wider field in which to work, for the notes of these lower denominations are not so meticulously examined as the "fivers" and the "tenners," and the opportunities afforded of passing spurious notes are much greater. Consequently, when the Bank of England took over the Treasury note issue, they decided to adopt for the printing of the fronts of their new notes the process commonly called "direct plate printing." The essential difference between this process and that of the ordinary typographic method is that in direct plate printing the work is engraved on a plate in intaglio, the plate is inked all over and thereafter the surface of the plate is wiped clean, the ink being left in the recessed lines, whereas in typographic printing the work is cut or etched so that the surface of the plate prints the impression, in exactly the same way as a newspaper is printed.

The engraving of an original steel plate is a work calling for very expert skill. The intricate patterns are engraved on special machines of so complicated a character that the operator himself without a record of the various movements would be unable to reproduce a design identically. The rest of the work is engraved by hand in the same manner that old-fashioned engravings were produced in the last century.

Since the day when the printing of English postage stamps changed from direct plate printing to typography in the early seventies, the former process has been very little used in this country. Consequently,


CYPRUS
1616 FL. PARLAMEN
A. CERVANTE
CORREOS
TURKIYE CUMHURIYETI
50 POSTA
1906
ROMANIA
5
POSTAL UNION
CONGRESS
LONDON 1929
POSTAGE
ONE POUND
£1
6
2/6
CROWN
REP. DI S.
30

BRADBURY, WILKINSON & Co. Ld NEW MALDEN SURREY, ENGLAND

SPECIMENS OF POSTAGE STAMPS
PRINTED DIRECT FROM STEEL PLATE

when the new Bank of England notes were first issued, many journals referred to them as foreign or American in appearance. The only possible reason for this comparison is the process of printing, for it would be hard to devise a design more different from that of the American notes.

In adopting this process for the £1 and 10s. bank-notes, the Bank of England has followed the general trend of European countries in the course of the last few years. Spain, Switzerland, Portugal, and the Scandinavian countries have had all their notes printed by this process for many years, but recently Turkey, Hungary, Yugoslavia, Bulgaria, Greece, and Czechoslovakia have followed their example.

There can be no doubt that the notes of these countries set the forger a far more difficult task than those of countries which still adhere to the typographic or lithographic methods. To give an exact reproduction of a direct plate printed note, a forger would have to engrave the work on a steel plate line by line. Not only would this be a lengthy and exacting affair, but the forger would have to gauge exactly the right depth to engrave each line. In typography, however, where the work is printed from a flat surface, he is able to use photography to obtain his plate, without any hand work except a touch here and there.

Throughout the Continent of America it has been recognized for many years that this method affords the greatest protection against forgery. In the United States not only does this apply to currency and bank notes, but the New York Stock Exchange will not list a security unless the share warrant or certificate is so printed. All the other American countries with the exception of Argentina follow the United States. Nearly all of them, too, employ direct plate printed stamps.

In Europe there are very few countries which go to the expense of direct plate printed stamps. The need for protection is not so urgent, owing partly to the lower face value of a stamp as compared with a bank-note, and partly to the difficulty which a forger meets with in selling his forgeries. Spain, Sweden, Turkey, Greece, and Czechoslovakia are the only countries in Europe which consider that the additional expense is worth their while. From the artistic point of view it is to be regretted that most countries have been forced from economic motives to adopt cheaper methods, for by direct plate printing beautiful effects are obtained which cannot be approached by any other form of printing.

PART VIII

PRINTING MACHINERY

CHAPTER I

NEWSPAPER PRESSES

INCREASED SPEED AND OUTPUT

Few people, other than those intimately associated with the printing industry, realize the wonderful developments which have taken place during the last few years in newspaper machinery. When we remember that 250 impressions an hour was the output of the early hand-press; that it required twelve presses working at full pressure to produce 20,000 copies in about six hours, and then compare this with the "Goliath" rotary presses in use to-day capable of producing over 300,000 copies in an hour, the layman will be able to visualize something of the amount of thought, skill, and money which have been expended in perfecting the newspaper printing machine—and most of this within the lifetime of many of those who are still actively engaged in newspaper production.

The Walter Press, which was patented in 1866, consisted of one unit, *i.e.*, only one reel of paper was used; to-day there is no limit to the number of units which can be placed in a straight line or on top of each other, the capacity of output hitherto being determined by the number of folders which it is possible to fit. Each of the latter is capable of producing something like 40,000 folded copies an hour. There is now a press in America working at the speed of 50,000 copies an hour per folder, and the same output will be possible in this country when the conditions demand it.

The following are some of the more important improvements which have been successfully introduced in recent years:—

Better inking, required for printing illustrations.

Supplying the ink automatically by means of pumps or sprays, and, more recently, by what is known as "film inking."

Finer impression adjustments, and more "solid" machines.

Printing a colour "seal" or lines at the same time as the news.

Adding the "late news" and changing the reel of paper without stopping the machine.

Mechanism for speeding up the securing of printing plates.

Improved folding mechanism and automatic brakes controlling the paper reels, which largely determine output.

Automatic conveyors from the folder, carrying the printed paper to the publishing room.

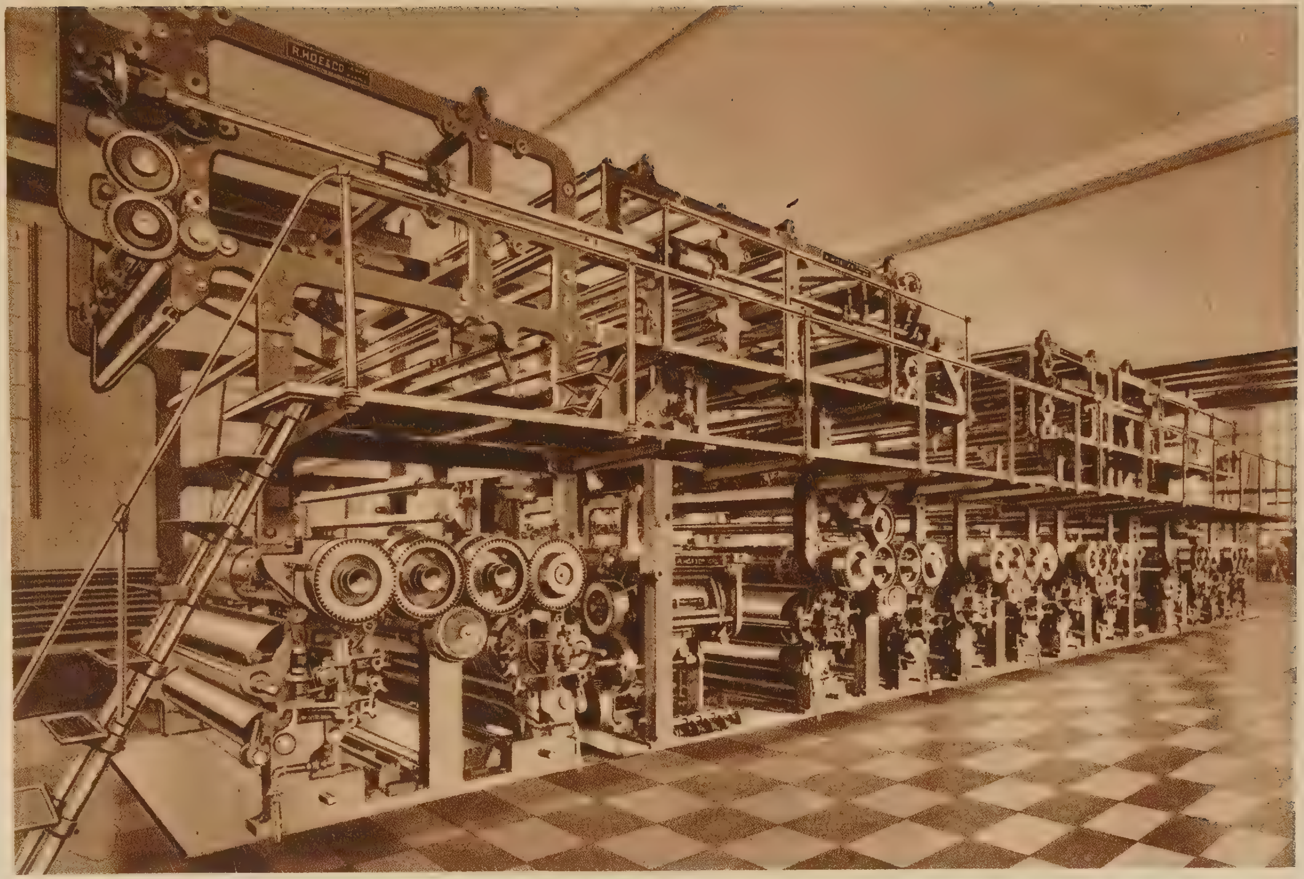
Development of machinery for automatically producing stereotype plates at a high rate of speed.

The long-established method of producing newspapers is being assailed. At present, so far as the production of newspapers is concerned, the letterpress method is still supreme, but constant endeavours are being made to harness up the sister processes of intaglio and planographic printing. Neither of these processes can produce newspapers at the speed of the letterpress method, but in the near future a new offset press will be in operation capable of printing in two colours at a speed of 27,000 copies an hour. It hardly requires a prophet to foretell that at no distant date the different printing processes will be vying with each other to offer to newspaper proprietors a method of printing their publications that will not only appeal to the public through the æsthetic style of their make-up, but provide a more rapid and economical method of production. J. R. R.

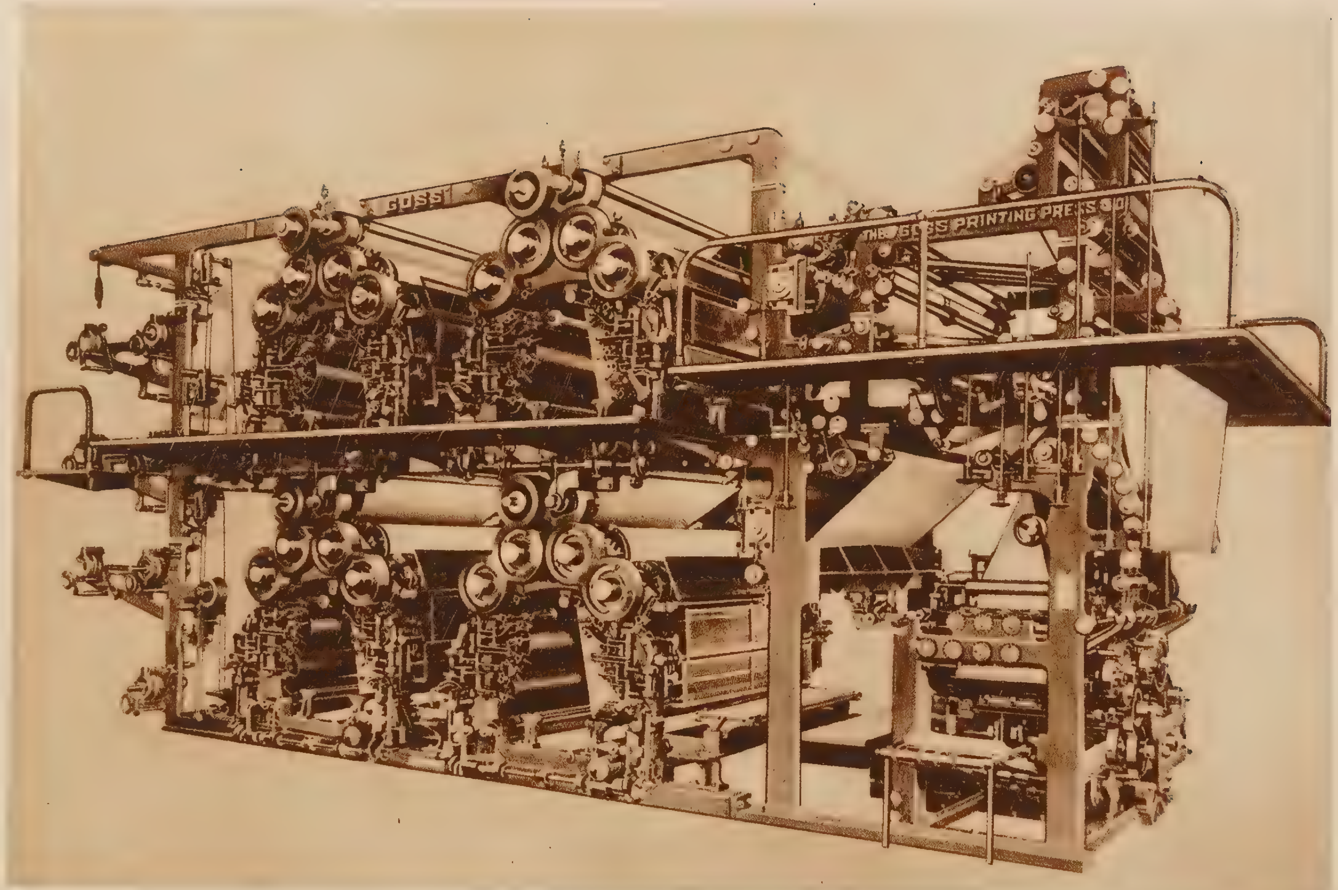
THE "DECK" TYPE PRESS

In the progressive development of rotary newspaper printing which followed the successful introduction of the Walter Press—the parent of all rotary presses—in *The Times* Office, the tendency at first was to build machines with their mechanism close to floor level, as was the case in the Walter Press. The presses which immediately followed, such as the earliest Hoe machines, the Victory, the Foster, and the Dawson, were all of low construction for working on floor level. They were also single-roll and single-width machines, no attempt being made in these early models to double the width of the paper reel and lengthen the cylinders so as to print two papers at a time or more pages of one paper simultaneously. Such an enlargement was not, in fact, necessary at that time, for newspapers were usually only of four or eight pages. When a six or twelve page paper was required on some special occasion the extra pages were inserted by hand. Folders on rotary machines were not introduced until late in the seventies, though as early as 1860 Joseph Foster, the founder of the firm of Joseph Foster and Sons, who had been associated with Joseph Livesey, the inventor of the first newspaper folding machine, devised a folder which ran in conjunction with the rotary machines of that day. But the folder of the "Prestonian" machine, patented by him in 1871, may really be considered as the parent of rotary newspaper folders. Hoe and Co. showed a rotary newspaper machine with folder at the Centennial Exhibition at Philadelphia in 1876, and Duncan and Wilson patented the "Victory Printing and Folding Machine" in 1879. At that time London newspapers were issued to the trade unfolded and uncut.

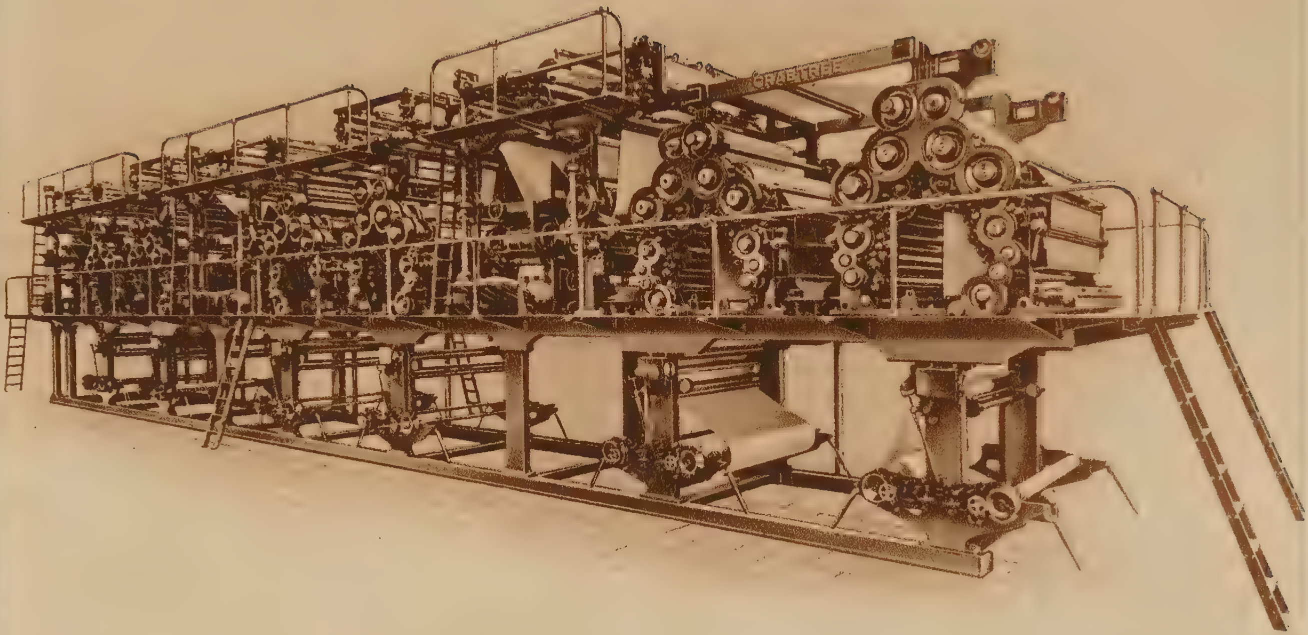
When the demand for more pages arose the press builders set to work constructing machines which would produce a varying number of pages, and machines were made to produce four, six, eight, ten, twelve pages, rising by two pages up to thirty-two pages. As it was found impracticable to produce these variations from single-width rolls, the way out of the difficulty was found by making presses two, three, or four pages wide, combining several press units in one machine frame, each printing from a separate roll of paper, but all conveying the printed web to the same folder, where the sheets were cut off and gathered into a complete newspaper. The supplement press was one form which was popular for a time: it consisted of two presses, one of double width and one of single width, placed at right angles to each other, but it proved an awkward arrangement where economy of floor space was a consideration. It was followed by presses with two double-width rolls at right angles. Many other variations and combinations were employed, but limitations of space in most newspaper offices prevented the adoption of that which has been found to-day the most rational arrangement of running several presses one after the other in line on the tandem principle. The press builders accordingly hit upon what appeared a very good solution of the difficulty by building one press over the other in "decks," as they were termed. This idea proved mechanically successful and soon became popular. From two decks they got to three, then to four and even five. The number adopted usually depended on the height of the machine room available, and much



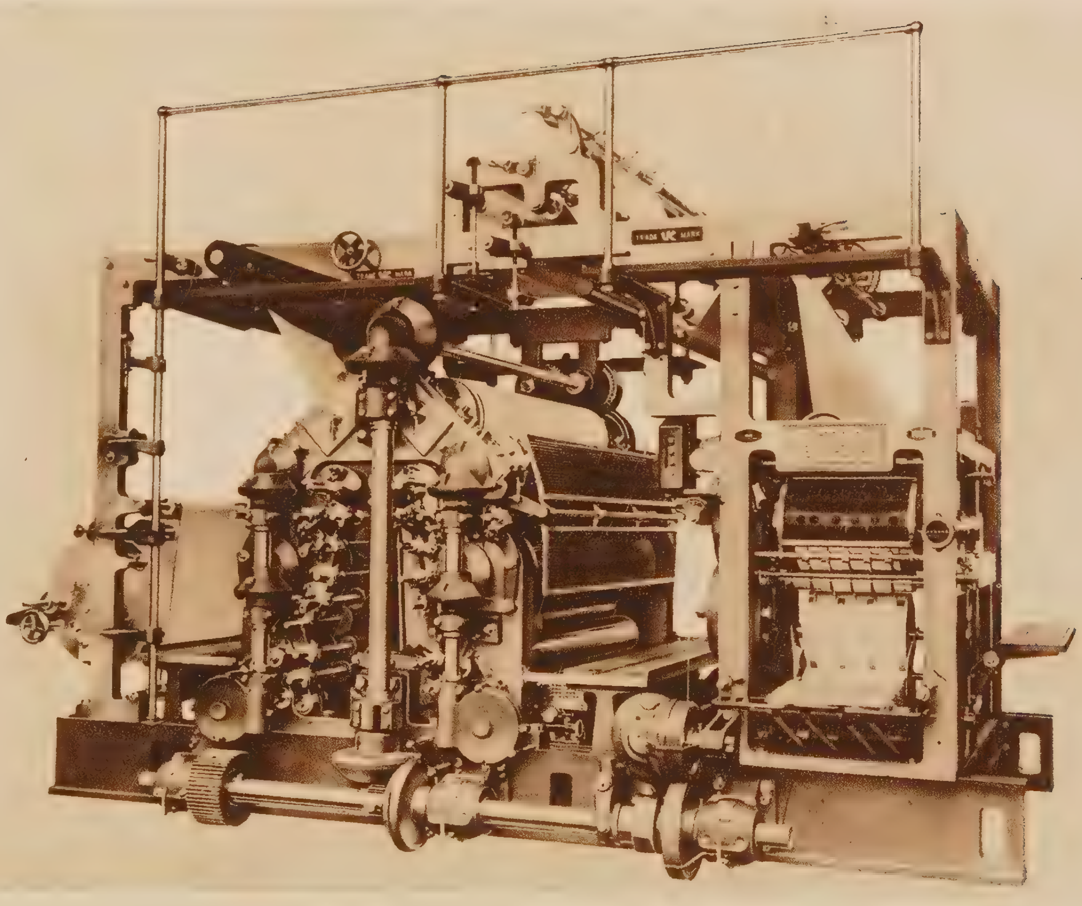
A Hoe super-speed six-unit line-type press fitted with solid forged steel cylinders, staggered roller bearings, and automatic ink pumps.


GOSS
THE GOSS PRINTING PRESS CO.

A high-speed Goss superimposed unit-type octuple press with inverted folders and a special device for "Late News."



A Crabtree super-speed press of the 6-roll balcony type fitted with automatic brakes and non-stop "Late News" device.



A Victory unit-type four-page wide high-speed newspaper press and folder.

excavation was done in London newspaper offices to provide accommodation for these monster "deckers."

Newspaper rotary presses are further subdivided into single width and double width. The single-width press carries four plates on each printing cylinder of the unit, two of the plates being duplicates of the other two, so that it yields two four-page papers of the usual daily newspaper dimensions at one complete revolution of the unit. The double-width press carries eight plates on each cylinder, four of the plates being duplicates of the other four, so that two eight-page papers are printed at one complete revolution of the unit.

In some cases presses have been built to take a reel three or five pages wide. In others provision was made for printing simultaneously from one roll two pages wide and one roll one page wide. But, whichever arrangement was adopted, the odd pages were assembled, inserted, and pasted in at the folder, the paper being delivered cut at the head and folded.

By this multiplication of printing units, and by increasing the width of the cylinders, the greater output required has been obtained. There is naturally a practical limit to the speed at which the respective cylinders can be run, and the speed of the folder is also a determining factor in the output, though in both these respects there has been a great advance in recent years.

Of course, when speed is referred to we must be careful to distinguish it from output. Cylinder speeds are pretty much the same in all types of presses, but the actual output in copies or in pages may be varied within very wide limits. When we hear of machines producing 144,000 copies per hour no conclusion as to actual printing speed can be drawn unless we know whether it refers to papers of eight, sixteen, or other number of pages.

In any case machine speeds and output have advanced a long way since the days when it was thought very wonderful to be able to print 1,000 copies of *The Times* an hour instead of 200 to 250 on the hand-press, or when the Walter Press turned out 10,000 or 12,000 copies an hour. The latter was by no means a poor record for speed when we consider that it was a single printing unit printing one copy at each revolution of the cylinders. On most rotary presses at the present day the cylinder speed is not more than 18,000 revolutions an hour. This illustrates the fact that the increased output of the modern newspaper presses is due to the combination of numerous printing units and duplication rather than to greatly increased running speed.

These huge "deckers" are awe-inspiring to the layman, and even to the ordinary printer, but when they are analysed into their units their construction and arrangement is comparatively simple. The probability is that the "decker" has had its day, and is destined to give place gradually to the "line unit" type, at any rate in the larger newspaper offices.

The firms who have specialized in the manufacture of the "deck" type and other forms of rotary newspaper presses are Hoe and Co., the Goss Company, Crabtree and Sons, Foster and Co., the Victory Company, and the Northern Press and Engineering Company, and each has done its part in bringing rotary printing machinery to its present high pitch of perfection. W. G.

THE "LINE" TYPE PRESS

The most outstanding development in web-rotary machinery for newspaper work in recent years—particularly since the War—has been the abandonment of the deck system and the reversion to floor level, utilizing length instead of height by connecting the various units in line. That it is really a reversion we have shown in our article on the deck type, for rotaries of low construction preceded the "deckers." This change has been brought about partly by the introduction of reel-feeding devices, by which the paper is fed up from below so as to enable the machines to run continuously without stopping to change the reels, and also avoiding an accumulation of paper reels on the floor of the machine room. At first this seemed to necessitate the provision of a sub-basement, but the press builders have found a practical alternative by erecting the line of presses on a platform or balcony, effecting the same result without having to go deeper, which often meant extensive excavation. The ideal arrangement is to have the presses on one level, the motors on another, and the reels on another, which makes everything accessible.

Whether the balcony system or the sub-basement is adopted is usually a matter of convenience, depending on the construction of the building. In some cases it was impossible to go deeper, and the balcony system had perforce to be adopted. Some press engineers think the balcony is the best in any case, as everything is in view on the machine-room floor, so that the work can be co-ordinated and the staff handling the paper reels better supervised. The aim is to run as far as possible without stoppages for reel changing, and with only moderate slowing down. As a reel is run off in perhaps twelve or fourteen minutes, and something like 400 reels may have to be handled for one edition of a big newspaper, the advantages of the system may be imagined.

The magazine roll-stand, made by the Witton James Company, is a reel-feeding device which is largely used, and consists essentially of two end-pieces, each having three arms, revolving on a central pivot. The reel spindles can be quickly attached to the ends of the arms, and each of the three reels can then be brought into position under the press unit served. The "Automatic Pasting System" enables the man in charge of the reel to attach the end of a new reel to the web which is running out without stopping the machine. These roll stands can be used either in the sub-basement or under the balcony, but in the latter case the balcony platform must be about 11ft. high to secure clearance.

Another system, used on Goss presses, is to have two reels on fixed brackets attached to the stanchions of the balcony, near the floor level. This allows one reel to be always ready when the other is running out, and pasting is done by hand while the machine is slowed down. With this method the balcony platform need not be more than about 6ft. 6in. high.

While, as we have said, the adoption of the "line" system was partly due to the use of reel-feeding from below, there are other important advantages gained, not the least of which is accessibility to all parts of the machines. The machine men can step right from the floor on to the machine without having to climb ladders and walk on narrow balconies. This is particularly a great convenience in "plating"—affixing the stereoplates to the cylinders—which is all done at breast height. Again, in threading the web through it is much more easily and quickly done with the units on the floor and in line. The new system also offers advantages in simplifying the combination of a varying number of pages. The units can be so split up and grouped as to obtain any size of press, and no units need be wasted or idle.

The grouping of the units is important. They are best arranged in groups of four to provide for the possibility of a thirty-two page paper being required, but it is possible to use 3½ units to meet special needs, and in America groups of five are sometimes used. The number of units in a line is dependent on the machine-room length available. The installation at the *Daily Mail* is forty-eight units, arranged in four lines with twelve units in each, this needing a length of 112ft. for the lines of machines and 140ft. length of machine room. Two of the lines of twelve units have been supplied by Hoe and the other two lines of twelve units are by Goss. The *Daily Telegraph* are having twenty-five Hoe units installed in two lines of ten and one of five, which may be increased later. The *Daily Chronicle* will have thirty-six units and folders in four lines when their installation is completed. The *Daily Express*, in addition to deck type presses, have four lines of six units and one line of ten units. Two lines of six units each and the ten-unit line have been supplied by Goss, as well as six-decker type presses. The other two lines of six units are installed by Hoe. At the *News of the World* Crabtree's are installing sixty-six of their units in four lines of fifteen units and one line of six units. The under-structure, consisting of a special sole plate running the full length of the press, carries the roll-stand equipment and the stanchions supporting the heavy cast-iron girders carrying the units and folders. When these five lines were erected it was not possible to detect any measurable variation in the level of the whole of the five lines. This plant is capable of producing 750,000 twenty-four-page papers an hour.

Messrs. Crabtree, while not building the first balcony type of press in this country, claim to have put in the first complete plant in Great Britain. This was installed in the offices of the *Edinburgh Evening News* in 1921, and consisted of two lines of units, carried on an under-structure, the reels being underneath the units. The short lead in to the units and out to the folder proved to be so effective that a set of reels could be changed in from forty seconds to one minute, the change being calculated from the moment of deceleration of the press to the moment of acceleration after the joint of the web had passed through the cylinders. Among modern installations where the reels are carried on top of the press is a complete battery in the *Edinburgh Evening News* new building, consisting of twenty units, and an eight-roll press now being installed in the *Scotsman* office. Messrs. Foster are installing line units in several provincial newspaper offices.

It is possible to have what is termed the "Superimposed Unit Line Type," which is a compromise between the "deck" and the "line" systems, adopted for economizing floor space where height is available. In this case there is a line of units on an upper deck.

There has been no basic alteration in the press units themselves. The line system is simply a rearrangement of their position to suit present-day requirements. The Goss Company introduced a straight-line high-speed press in 1907. Publishers quickly recognized the immense advantage of machinery that increased their output fully fifty per cent. without any increase in cost of operation. The unit system has enabled the press manufacturers to build the machines on more standardized lines, and the tendency of newspapers to adopt a standard size of page is better alike for the printer and the press manufacturer.

Concurrently with the development of the unit system, press speed, or rather volume of output, has been advancing. Cylinder speeds are normally 18,000 revolutions an hour, or 300 revolutions a minute, but Hoe and Co. are now able to guarantee 21,000 cylinder revolutions an hour, which is equivalent to a folder output of 42,000 copies an hour, and presses have been successfully operated at 50,000 copies an hour. A Hoe press has been built to run up to 60,000 copies an hour, but the difficulty of running at these high speeds is one of getting the papers away quickly enough from the conveyors to the publishing room. This is the bottle-neck of the system, and will remain so until some new mechanical means are found of remedying it.

The method now generally used for conveying the papers from the folders is the wire conveyor system of the Igranic Company, which is a great improvement on the old belt system. The wire conveyor is driven by a separate small motor which is synchronized with the press speed.

That it is possible to get greater speeds on rotary presses has been demonstrated on a new kind of line press, designed by Mr. H. Wise Wood, which is already in use in one or two American newspaper offices. This press has been run for short periods at 30,000 cylinder revolutions an hour.

The Duplex Tubular Press is a machine which is capable of very high speed, due to the fact that the cylinders are half the diameter of those in the usual types of rotary presses. The press carries stereoplates which are almost a complete tube, there being only a small gap between the two ends of the plate. Each tube forms one page of the newspaper printed, and there may be two plates or four plates on the cylinders to enable two-page or four-page width of webs to be printed. The advantage claimed for this press is that while in the presses carrying semi-cylindrical plates each plate is printing only half the time, the other being "in the air," so to speak, the whole circumference of the cylinder is printing all the time in the tubular system. Moreover, the smaller cylinder of the tubular press revolves twice in the time for a complete revolution of the semi-cylindrical plate cylinder, so that when working at the same peripheral speed double the output is obtained from the tubular press and with half the number of plates. The Duplex is built in various styles, one of which is of the "line unit" type. W. G.

CHAPTER II

IMPROVEMENTS IN ROTARY PRESSES

EASIER WORKING AND ECONOMY

Numerous improvements in detail have been made in rotary presses, all tending towards easier working, economy of running, and improvement in printing. The automatic ink-pumping mechanism which Hoe and Co. patented in 1915 for high-speed newspaper presses is one of the most important improvements in the evolution of the up-to-date newspaper office. Instead of the old-fashioned method of pouring ink into the ducts from drums or cans, the ink now comes to the printing office in a tank lorry, which discharges its load through a pipe direct to a central tank in the building, whence it is forced by compressed air through pipes direct to the press, passing through no fewer than three graduated strainers, which may be cleaned or changed at any time. At the press the ink first comes into a pump box, located outside the press frames on one side of the machine. The box is fitted with adjusting screws to regulate the flow of ink to each column of the page to be printed, and other screws are provided to cut off the ink supply from an entire page, when it is desired to print a different width of reel. A page containing half-tones can have its ink supply regulated differently from the text pages. Another feature of the system is that the lifter roller which used to be necessary to convey the ink from the duct to the distributing drum is entirely abolished, effecting several economies, not the least of which is the saving of the cost of the rollers and their renewal.

The Crabtree presses have a continuous film inking device with vertical blade which can be adjusted very finely by a distant control at the side of the press. Whatever speed the press is running, just the right amount of ink for inking each revolution of the cylinder is fed. There are no feeder or lifter rollers, the ink duct roller being set close to, but not touching, the ink drum and slowly revolving by means of an almost infinitely variable mechanism. This arrangement can be fitted to existing presses in place of the older systems.

Goss have an ink fountain in which the ink flow is regulated by screws pressing upon a flexible steel scraper blade near the edge that lies against the fountain roller, the ink being regulated for each column.

Solid steel forged cylinders have been adopted by Hoe and Co. in place of the old-style cast-iron cylinders, with the advantage that they are homogeneous and unbreakable. The precision obtained, and their absolute rigidity, enable the finest quality of printing to be turned out at the highest rate of speed. The cylinders are dynamically balanced and are mounted in the press in a new type of roller bearings which keep the cylinder rigid and decrease the starting inertia of the press. It is now possible for one man to rotate a complete printing unit by turning a handle when the press has to be moved without power.

There have been great improvements in folders in recent years. No longer can it be said that the speed of the machine is governed by the capacity of the folder, for the latter now meets every increase in the speed of the press. This has been brought about by securing an all-rotary motion, and in the Hoe folders there are no cams or timing mechanism. The tubular folding cylinder is equipped with pockets enabling the machine-man easily to insert his hands, without danger, to adjust the needles of the folding mechanism.

In the Goss folder the rotary folding guide makes only one folding stroke as compared with three, two of which are idle strokes, in other makes of folders.

Automatic oiling systems are now a feature on all up-to-date presses. Hoe's have an oil pump and pressure lubrication on their presses.

Rubber rollers are now being largely used; in America they are said to be universal on rotary presses. They last much longer than the best composition rollers, and require no washing up. The "Mintite" is a new form of roller, somewhat like rubber in appearance, which is being tried with good results.

Improvements in cylinder packing have brought about better printing, both of text matter and blocks. Blankets with special composition coatings, such as the Automatic or the Monocork, are now mostly used instead of the old felt blankets, which had many drawbacks.

Plate-locking devices on the cylinders have been greatly improved in ease of operation and safety. Each maker seems to have some new feature in this respect.

Crabtree hydraulic reel brakes give a very sensitive distant control. The automatic brake is almost uncanny in its functioning. It clearly shows the faults in the making-up of the reels. The brake pressure is actually applied according to the tension of the paper as it runs through the press cylinders. When the reel is put in the press the brake is screwed up by hand in the ordinary way, but as soon as the press starts up it automatically adjusts itself to the correct pressure; as the reel runs down and less brake is required it is automatically dealt with. In addition to this, the variation in the winding of the reels is also provided for. To show how sensitive this brake is, if an oil-can is applied to the brake pulley, reducing the friction between the block and the pulley, the brake immediately comes into action and compensates for the extra lubrication that is being put on. If then the oil is wiped off and the friction increases, the brake again shows that it can be relied upon and immediately comes into operation.

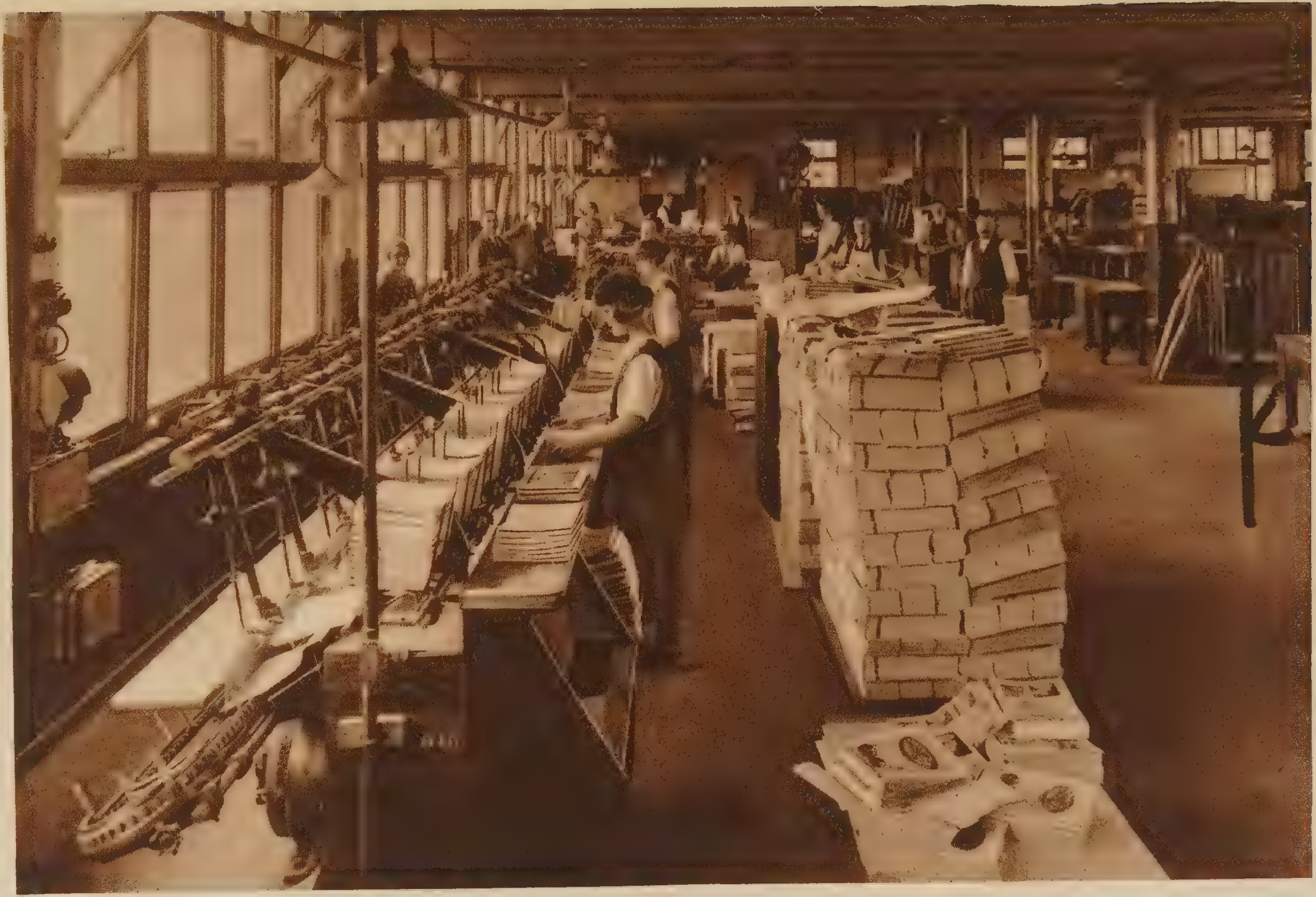
In one way or another everything is now made easy for the men operating the machine, and in spite of the greater size of the presses, the increased rush of printing, and the greater volume of product to be handled, the manual effort has been considerably reduced.

The "fudge box" for the insertion of late news has been greatly improved. Usually the press has to be stopped or slowed down for changing the ordinary late news attachment, but the Crabtree Late News Device enables the late news to be added while the press is running at full speed. This is accomplished by having the apparatus with its own impression cylinder independent of the deck or unit; in fact, it is an extra printing unit carrying the "fudge boxes" on a shaft, with its own inking device and impression cylinder so arranged that any box can be thrown in or out. Within the same mechanism is an attachment for printing a red seal or a banner line in red.

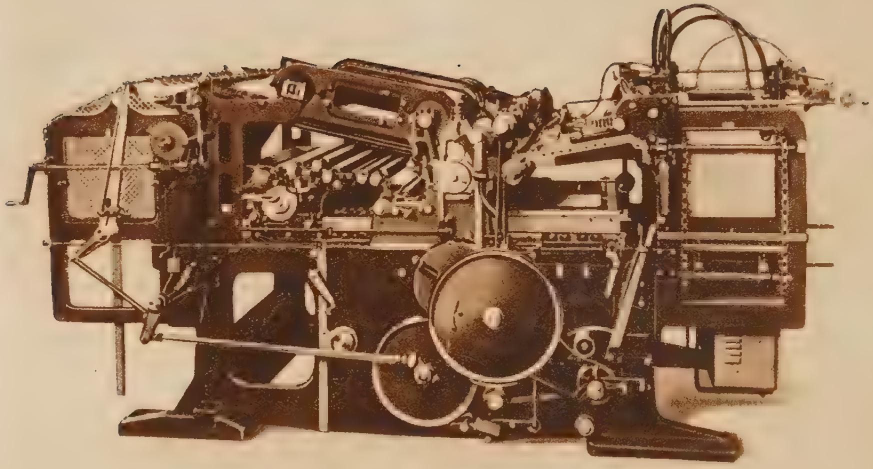
Special decks have been added on some machines for printing one or two colours, but these have so far not been much used.

The Hoe Company have a multicolour and black rotary web perfecting press for printing newspaper coloured comic, magazine, and tabloid sections in various combinations with or without black sections. This is largely used by American newspapers, but so far the idea has not been taken up in this country, at any rate for newspaper supplements, though it is used for weekly journals of the comic type.

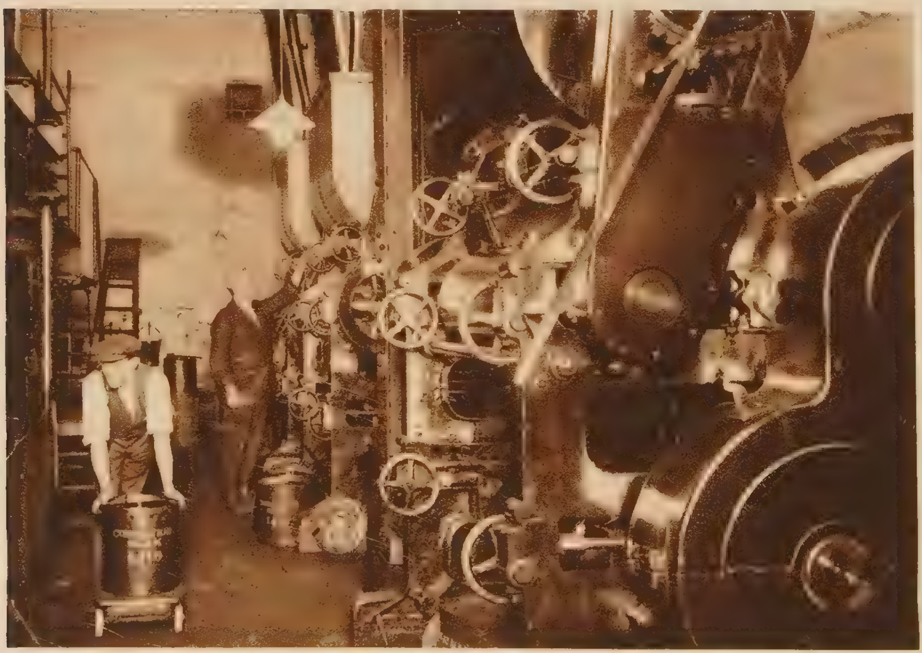
W. G.



The Juengst Perfect Binder in operation at the Aylesbury works of Messrs. Hazell, Watson & Viney. The machine gathers the different sections of a magazine, stitches them, and glues on the cover. It can bind 3,000 magazines an hour.



The American Miehle Company's horizontal press, one of the latest type of automatic jobbing presses.



A double-deck grinding mill in the Ink-making Works of The Empire Printing Ink Company, Ltd.

CHAPTER III

BOOK AND GENERAL PRESSES

PILE FEED AND DELIVERY

The tendency of printing machine design since the War has been towards obtaining greater speed and output, without sacrificing quality in the product. The Americans led the way with such presses as the Kelly, the Miller, and the Vertical Miehle, the success of which has spurred on English and Continental makers to emulate them. Speed was found to be largely a matter of greater rigidity and precision in construction, while output depended on the adoption of automatic feeding and improved delivery mechanism. It was useless to speed up the machines so long as they had to be hand-fed and delivery was troublesome and imperfect. Efficient automatic feeders and delivery mechanism simple enough for the least intelligent operator to understand and work, are, however, now available, and have proved the solution of the problem. Viewed at first with prejudice and doubt, owing to the troubles met with in the early types installed, the automatic feeder has won its way to complete recognition as an indispensable adjunct to modern printing presses. The progress made in this respect has been really remarkable, and in many of the latest presses the automatic feeder, by being built into the machines, forms an integral part of them, thus obviating the necessity of making separate adjustments. This in itself contributes largely to the efficiency of automatic feeding, for undoubtedly many of the troubles with mechanical feeders in the early days were due to attaching them to existing machines which for various reasons were unsuitable for the purpose in view.

The success of the automatic feeder, especially the type which feeds from the pile, brought about the automatic pile delivery—a necessary complement to the other. With ingenious mechanism the pile at the feeder end gradually rises, while the pile at the delivery end equally lowers until it is necessary to remove it, which can be done by running a truck under the platform and drawing it away, to be replaced by an empty platform. Some objections have been raised to the pile delivery on the ground that set-off may occur at the bottom of the pile through the weight of the sheets above, but this does not occur in practice, as the film of air between the sheets remains long enough to keep the sheets separated while oxidation of the ink takes place. Extended delivery is also adopted to facilitate drying. This system leaves the sheet longer in the air between the machine and the pile.

The great advantage of the pile system, both at the feeder end and the delivery, is that the height of the pile represents practically the day's work, so that a considerable amount of time usually spent in handling a multiplicity of small piles is saved, and spoilage is prevented. Face-up delivery is now considered a desideratum in all modern presses, and this is obtained in the two-revolution machine by reason of its design. In the early types of Wharfedale machines delivery was necessarily face down, but with what is known as the "Perfection" delivery, applied alternatively to the latest presses, the sheet is delivered face up without the use of "flyer" laths, which are a common cause of many press troubles. Another new kind of delivery applied to Wharfedales to obtain face-up working is the "Ranger," in which a travelling band, rolling and unrolling somewhat like a window blind, receives the sheet and deposits it on the delivery board. A Continental maker has applied to the stop-cylinder press an air control delivery, in which a current of air against the direction of travel supports the sheet until it is delivered face up.

Great improvement has taken place in the inking mechanism of all forms of presses of late years. The needs of half-tone and colour printing have demanded this. Instead of the inking rollers merely riding in contact with the forme they are held in bearings, with suitable adjustment for making and maintaining the required contact; they are also in most cases gear driven, instead of being rotated by friction as formerly. Where, in the old days, two inkers were generally considered sufficient, three or four inkers are now used. In the smaller machines three rollers are adequate.

With the higher speeds at which presses are being run, and especially in the case of the automatic presses,the heating of the rollers is becoming a problem, and new forms of roller covering are being tried. The "Mintite" is one which has given satisfactory results.

The provision of a flexible steel ink blade to the ink fountain, with adjusting screws to regulate the supply of ink, is now a regular feature on the best presses. Geared distribution is also a part of the regular equipment, and in some presses cylindrical distribution has been adopted. Beds and cylinders are now ground true with the highest precision, and greater attention is being paid to perfect gear cutting.

In the "Standard" Wharfedale the bed movement has been greatly improved, and a new catch mechanism, known as "the silent pick-up," for the stop-cylinder movement, gives the necessary strength and rigidity to withstand the heavier duties of increased speed. In the old pattern Wharfedales the highest speed was about 2,000 an hour, while now, without depending on buffers, speeds of 3,600 are obtained on the demy size "Standard" machine, and on the "Swift" pattern 4,000 is attained. With the improvements introduced into the Wharfedale it is not surprising to hear that this type of machine, which has now stood the test of over seventy years' experience, is proving more popular than ever, in spite of the competition of the two-revolution machine. The relative cheapness at which the stop-cylinder press can be built and sold is probably one of the chief reasons why it is so much used, but, apart from this, it is held that for the average printer, and especially in small shops, the stop-cylinder answers all requirements because of its adaptability to short runs and varying size of jobs; also because many small runs are done without the aid of the ink duct.

For long runs on the highest class half-tone and colour, and for fine typographic work, especially catalogue and book printing, the two-revolution is undoubtedly the ideal machine, and it is being more and more used. The means employed for driving the reciprocating bed and the continuously revolving cylinder, as well as for ensuring synchronization between these two independently driven members, are simple and positive, lending themselves to fast running. The Miehle two-revolution machine has held the field almost unchallenged for over forty years. There are two distinct makes on the English market—the American Miehle Company's press, made in America, and the English Miehle, made by Linotype and Machinery, Limited. It is no discredit to either to say that there is little to choose between them, though each has particular features which appeal to the practical printer. In both cases the machines are made in a range of sizes suited to all requirements. They are supplied with automatic feeders and pile, or extended pile, delivery, or without these features.

The objection of inaccessibility urged against the built-in automatic feeder is overcome in some of the latest types of the American Miehle, which provide for the feeder unit being swung back to expose the bed at this end of the machine, enabling the forme to be easily put in or withdrawn, and, if necessary, worked on. In the Automatic Horizontal press of the same makers both the feeder and the pile-delivery mechanism can be swung back to give access to both ends of the machine. This is a remarkably compact press, besides having all the elements of accessibility, and will print a practically unlimited range of work on sheets from 6×9 to 21×28 inches at speeds up to 3,600 an hour.

Several English firms are making two-revolution presses. Furnival and Co. have made them in large sizes for many years past. The tendency of other English makers, however, is to apply the two-revolution principle to small-size fast-running automatic presses, fitted with automatic feeder. The "Waite" is of this class, with a practicable running speed of 3,600 impressions an hour. The "Harrild" Auto-Rapid in foolscap size will yield 3,500 to 4,000. The "L. and M." Automatic, in demy size, with pile feeder and pile delivery, has a guaranteed running speed of 3,000 an hour on high-class work. An automatic machine which stands in a class by itself is the American Miehle Company's Vertical Press. It has the compactness and convenience of a platen press with the advantages of a cylinder machine. It works on the stop-cylinder principle with the vertical forme bed reciprocating up and down, while the impression cylinder also reciprocates in a like manner to the bed, but in a contrary motion to it. The normal speed range is 2,000 to 3,600 an hour. It has automatic feed and delivery. This machine is displacing the platen press for long runs and rapid work.

There are some people who express the opinion that the platen press has had its day. Nevertheless, there are probably more platen presses being made and sold than ever, and new patterns, or improvements on the old ones, are constantly appearing. Automatic feed and delivery have been applied to some models, and high speeds are being obtained. The Auto-Falcon of Waite and Saville has been run up to 4,600 impressions an hour on cards and envelopes. The probability is that the platen can never be displaced for the general run of small jobs in small shops, and it is indispensable for printing on thick and stiff material, such as calendar mounts, &c. It is also largely employed for cut-out work and embossing. To the photo-engraver it is invaluable for proofing colour work, though some printers think it would be better to proof on a cylinder press, because the results from the two methods are quite different.

The two-colour cylinder machine has been more favoured of late years, and is now employed on better classes of work than formerly.

Both the American Miehle and the English-built "L. and M." presses are excellent machines in this class, and a new two-colour Wharfedale has been brought out which overcomes some of the limitations which were common to the older machines. It is now quite a usual practice on these two-colour machines, by working a sheet half the normal size, or smaller, to complete the printing of the whole of a three or four colour set in one operation, dividing up the ink fountain for the different colours and arranging the forme suitably for strip inking. An ingenious device is the Upham colour attachment to the American Miehle press. This consists of a supplementary cylinder on which curved plates can be clamped to print the second colour, the first being from the formes on the bed of the machine. Alternatively the reciprocating forme bed can be put out of action and the machine run from curved plates as a sheet-fed rotary at a very greatly increased speed.

There is a growing tendency to revive the use of sheet-fed perfecting presses, of which the American Miehle and the English "L. and M." are the best types. For illustrated books, catalogues, magazines, &c., such machines offer important advantages of greater output, less running expenses, and economy of floor space, compared with single-side machines. It is, of course, important to ensure equality of colour and sharpness of printing on both sides, with absence of set-off, but these points are well provided for in the modern machines.

Little inclination is shown to use rotary web machines for book and magazine printing, at any rate where the work is of a good character, though there are many weekly periodicals produced in this way. As a consequence there are no improvements to note in this class of machinery, except, perhaps, in the construction of the folders. An important exception is a stereo web rotary machine used by the Greycaine Company for the production of the "Reader" Library of cheap books. It prints 384 pages at one cycle of the machine, delivering them folded and gathered. The "Cossar" press may be mentioned in this section, as it could not be classified with the stereo rotaries for newspaper work because it has the unique feature of printing from the web with flat type formes. It fills the gap between the perfectors and the two-feeder Wharfedale on the one hand and the rotary stereotype web press on the other. For weekly newspapers with circulations between 15,000 and 20,000 and for daily newspapers with circulations up to 10,000 it shows a large saving over the stereo rotary by reason of avoiding the expense of stereotyping. W. G.

CHAPTER IV

OFFSET PRINTING MACHINES

FLAT-BED AND ROTARY

In the practice of lithographic (planographic) printing there are three kinds of printing surfaces—namely, stone, zinc, and aluminium plates. In carrying out the printing there are machines for graining the printing surfaces, hand-presses for transferring, or proving or printing small orders, and machines for printing larger orders running at 1,000 to 4,000 sheets an hour. These machines are designed as flat-bed and offset flat-bed or tinplate printing machines, and as direct rotary and offset rotary printing machines, which are also built for tinplate printing.

The term offset implies that the printing is set off or transferred. It is the expression used when by accident, in the ordinary method of lithographic printing, a machine omits to feed a sheet at the proper time and thus causes the ink on the stone to be printed on the cylinder covering, and then feeds another sheet at the next revolution, which receives a print on the front from the plate and another on the back from the cylinder covering or blanket. It was such an accident, common enough in lithographic printing, which suggested to Ira W. Rubel the idea of a machine in which, instead of taking an impression directly upon paper, the impression or print is received upon the rubber covering of a cylinder, which then becomes the printing surface from which the impression is taken upon paper. Thus originated the offset machine, which since 1906 has altered the whole aspect of lithography (planography).

The flat-bed machines consist of a table or carriage to support the stone or plate, which is driven accurately to and fro under damping rollers, the impression cylinder, and the inkers. There are automatic water supply and ink supply, and in many machines there is automatic feeding of the paper, and delivery on a pile of the printed sheets.

In the offset rotary the plate cylinder in each rotation meets the damping rollers, the inkers, and the rubber-covered cylinder, whereas in flat-bed machines it requires a double traverse for the same operations. The principle of rotation allows for greater speed and in all other ways is more economical.

The great advantage of the offset machine is its ability to print upon any rough paper or board of the thinnest or thickest measure, and regardless of the hardness of the surface, a result which it is almost impossible to obtain by letterpress machines, and only under considerable pressure. Metal, celluloid, and fabrics can be used; and there is no longer a necessity to use enamel papers for chromo-lithography, providing the paper is white and of good body. Moreover, it has become much less difficult to print from cross-line photographic subjects, and there is an added softness which gives the appearance of fine collotype pictures or copperplate engravings.

In offset printing there is no indenting on the paper, and there is no need to force the paper into contact by underlaying with paper patches; in fact, only the lightest pressure is necessary to obtain the print.

It seems curious that an offset or indirect method of printing should prove so effective, but experience has put it to the proof in every possible way, and it may now be looked upon as not only the most modern but a most attractive style of printing.

The offset machine has, indeed, now reached a high state of development. It is not restricted to printing in black only; any class of colour work can be executed with equal efficiency, as may be seen in chromo-lithographs used as advertisements in all branches of business.

In photographic work the offset process has particular advantages. However well photographic originals may be obtained upon stone, zinc, or aluminium, the usual flat-bed or even the rotary printing machine fails to get the full results in any way comparable to the results by offset. It appears that the rubber covering of the cylinder dips into the grain of the zinc or aluminium and lifts every particle of the photographic original.

Many machine-makers build flat-bed machines with an offset attachment which can be put out of gear whenever it is necessary to use a flat-bed machine as such. This type of machine suits a large number of printers, and many firms have these offset attachments fitted to their "old" flat-bed machines.

The offset machines of the latest manufacture have shown great developments, such, for example, as the machines of Messrs. George

Mann and Co., Limited, which now have the cylinders and principal working parts made of steel. The substitution of built-up steel components for complicated heavy castings is an entirely new departure in printing-machine construction, and will no doubt be a benefit to the trade, in so far that speed is increased by lighter moving parts and less power is consumed. Such machines printing four-colour photo-litho pictures were shown at the Olympia Exhibition in April, 1929. Their single and two colour machines have been installed in many printing houses closely associated with high-class colour reproductions.

Another firm of offset machine makers, Messrs. R. W. Crabtree and Sons, are introducing a combination of a one or two colour offset machine for working with the text of magazines or newspapers, so that first-class photo-litho pictures can be printed on reel-fed machines and inset in a newspaper printed typographically.

At the Olympia Exhibition, 1929, this firm showed a two-colour machine with the new Elless feeder, running at 4,000 sheets an hour, and so controlled that any sheet misfed stopped the machine for an instant for correction. Another machine, shown by Messrs. Faber and Schleicher, was also running at 4,000 sheets an hour.

The latest models of the British-made offset machine were shown at the Exhibition by Messrs. Furnival and Co., Messrs. J. Ratcliff and Sons, Messrs. Waite and Saville, and Linotype and Machinery, Limited. They were all fitted with automatic feeders of such types as the Universal, Dexter, H.T.B., Camco, Spiess, Elless, and those made by the machine-makers themselves, including at least one of the "built-in" feeders.

C. H.

CHAPTER V

MACHINE DRIVING EQUIPMENT

ELECTRICAL POWER DEVICES

Individual drives have always been recognized as the ideal in printing offices, and in this connexion the electrical drive has been a boon to the printing trade. The electric motor adequately fulfils all the varied operating conditions of speed and torque, combined with smooth regulation of speed from creeping to maximum printing speeds. Moreover, the complete control of any unit can always be ensured by the simple operation of push-buttons. It is the simplicity and flexibility of control and operation which has contributed so much towards improved quality of work at high speeds, and to the adaptability of presses to work of varying size and character.

Electrical drives are successfully applied to all machines used in printing works. These can be broadly divided into two sections :—

(*a*) Flat-bed letterpress machines which print from sheet.

(*b*) Rotary machines which print from the reel.

Practically all machines which do not fall into either of these two classes require drives of a simple nature and having simple controls. This also applies more or less to the flat-bed class, as even here it is essential that the control and drive, while fully meeting the requirements, should be as simple as possible. Rotary machines, however, and particularly those used for newspaper production, present more difficult problems from the driving point of view, and it is proposed, therefore, to deal particularly with the developments which have been made in this connexion. It can be safely taken that the same tendency to improved and more reliable operation which has taken place in the larger drives applies equally well to all others.

The duplex motor equipment, originally introduced about 1899 by J. H. Holmes and Co. in their "Holmes-Clatworthy" system for rotary press drives, using direct current motors, has for its principle the use of a small auxiliary motor for "inching" and "leading in," and of a main motor for printing. The auxiliary motor, which is coupled through a high-efficiency reduction gear and some form of self-releasing clutch to the main motor, is capable of giving the very high torques required during the starting period while only making small demands on the supply. Having started the press, this motor continues to drive until the main motor has been energized and has taken up the load, the auxiliary motor then being automatically stopped. The press can then be smoothly and uniformly accelerated on the series and shunt regulation of the main motor, to give any desired printing speed. The main motor is designed so that printing speeds are always obtained on its shunt range, and thus for all working conditions—"inching," "leading-in" and printing—the equipment is working at high efficiency. The controller, which ensures the correct sequence of switching and governs the speed regulation, is screw-driven by a pilot motor, under the control of push-buttons. These usually consist of "inching," "starting," and "speeding up," "slowing down," "stopping," and "safe" and "run" buttons, and with these it is possible to meet every press-room requirement and ensure safety to the operator. The electrical circuits are so interlocked as always to ensure correct operation and to render the control practically foolproof.

As this system, which has been briefly described, has become practically universal—the only exception being perhaps the "Gem" system, in which the auxiliary motor is replaced by a small motor generator set which is used to supply, at low voltage, the starting current, this being applied directly to the main motor—developments have necessarily not been of a particularly outstanding nature. They have been chiefly in the direction of increased efficiency, smoothness of working, greater freedom from breakdown, and giving better quality production at increased speeds, and these have been attained by a general improvement in the design and performance of all the components of the equipment.

One interesting development in the speeding up of production is the continuous feed of the web, without stopping the press. This feature is now in use in a number of offices, and is likely to develop, and although the more difficult problems have been associated with the mechanical features of the joining device, the control and operation is bound up with the driving equipment, and is worthy of mention. The equipment for joining the webs together consists either of a "triangular" reel stand, usually installed in a basement below the press and holding three reels of paper, which are mounted, and can be rotated around a common spindle, and being a development of the reel stand originally introduced by Kohler about twenty-five years ago, or of a joining device capable of holding two reels and generally incorporated in the understructure of the press. The facilities at each printing office generally determine which type is to be preferred.

The operation in either case is similar : when a reel is running out the operator, by a push-button, automatically reduces the speed of the press to a suitable and predetermined value. In the case of the joining device, a new reel, which has been suitably pasted in preparation, is mechanically brought into contact with the web from the exhausting reel, and with the tensioning belts on the running reel serving as a "backing" or support, a join is effected. The web from the new reel is carried through the press, the old web then being severed. In the case of the reel stand, the frame carrying the reels is rotated by a small motor under push-button control, to bring the new and old webs into contact to give the same result. After the join has been made the press is again accelerated to printing speed. This development has considerably reduced the time taken for renewing webs, and makes an appreciable increase in output. The speeds at which joining is at present effected are necessarily low, and are usually obtained with the auxiliary motor driving the press, but at a speed well in excess of the normal "leading in" speed. This arrangement has necessitated the use of a clutch between the auxiliary and main motor which is reversible in the sense that is must be possible to transfer the drive from one motor to the other whether speeding up or slowing down. This can be obtained by using a clutch with centrifugally lifted pawls, but an improved and novel form of clutch has been introduced by J. H. Holmes and Co., in which the action is strictly dependent, as is desirable, on the relative speeds of the two motors, and a perfectly smooth transfer of the drive is obtained when either speeding up or slowing down. The tendency in joining devices will be towards an increase of the speed at which joining the webs can be effected, with the resultant saving in time during production, but this development is essentially associated with the joining device and not with the driving equipment.

The principle of the duplex motor equipment naturally applies equally well to either direct or alternating current drives, and while the foregoing remarks have dealt more particularly with the former, they also hold good for the latter. The alternating current equipment has usually consisted of a squirrel cage or slip-ring induction auxiliary motor and a slip-ring induction main motor, and with control gear on similar lines to that used for direct current equipments. The induction motors form a particularly robust equipment, but where large speed ranges are required they do not attain the efficiency of working which is possible with the shunt regulated direct current motor. The reason for this is that the speed range in the case of the former is obtained by rotor regulation, which can be compared with the series regulation in the case of the direct current motor. The induction motor equipment can only compare from the point of view of efficiency when operated at a speed approaching its synchronous speed. Thus, where large speed ranges are required, the direct current equipment, although not attaining the robustness of the induction motor set, has always received preference on account of its high efficiency.

The development of the three-phase commutator motor has, however, rather changed this aspect. These have, for a number of years, been designed to give very satisfactory performance and they are inherently suitable for rotary press drives. The commutator motor can have many forms and varying characteristics. That made, for instance, by British Thomson-Houston, Limited, has a shunt characteristic and is similar to an induction motor, in that it has a primary and secondary winding, these being arranged in the reverse manner to that usually employed for induction motors—the primary being on the rotor and fed through slip-rings and the secondary on the stator. In addition, there is a second winding on the rotor which is connected to a commutator, which has two separate brush rockers arranged so that they can be moved relatively to each other. The brushes feed into the stator windings, the effect being that relative displacement of the two sets of brush gear regulates the speed of the motor, and this regulation can be obtained above and below the synchronous speed of the motor and can give, in all, a range of 3 or 4 to 1. The operation of the equipment is similar to that already described for the direct current equipment, except that it is this brush movement, which is made by a pilot motor under push-button control, which gives the speed regulation. The movable brush gear and commutator can thus be considered as the equivalent of the controller in the direct current equipment. A small master controller is used to ensure correct sequence of switching. No resistances are used in connexion with the main motor, and the absence also of a controller makes the equipment in this respect somewhat simpler than the direct current arrangement. The commutator motor also operates at high efficiency throughout its speed range, and its power factor is also higher than that of an ordinary induction motor due to its inherent power factor correcting properties. In view, therefore, of the developments in electricity supplies throughout the country, there is likely to be a correspondingly increased application of this type of driving equipment.

CHAPTER VI

STEREOTYPING

IMPROVED PLANT AND METHODS

It is interesting to note the way in which improvements in plant and methods creep quietly into a comparatively old industry until, finally, they become the accepted practice in that particular trade.

Such is the position with regard to stereotyping to-day, for although this process of printer's plate-making outwardly remains in practice very much as it was, say, twenty years ago, yet in this country many improvements in detail have been introduced, and as a result the high quality of British stereotyping is universally recognized, as shown by the number of oversea visitors who come to this country in search of information.

The stereotyper's work begins when the compositors have screwed tightly in a steel frame, called a "chase," all the Linotype slugs, &c., that go to the making up of a page. The "forme," as it is now termed, is passed through to the foundry, and the work begins of making a large number of curved or "rotary" plates of a standard size and thickness, the printing face being an exact duplicate of the type page.

Twenty years ago the first operation, the making of the matrix or "mat," was as follows: The forme was pushed on to the table of a matrix-rolling machine (or "mangle") and a sheet of wet papier-mâché (called "flong") laid, tissue side down, upon the top. Upon the flong a thick sheet of rubber, or one or more layers of thick woollen blanket, was placed, and the whole then passed through the mangle. The enormous pressure exerted by the roller of the mangle caused a deep impression of the type to be made in the flong.

To retain this impression the forme, with the flong still in position upon it, and a couple of soft drying blankets on top, was next placed in a steam-heated drying press, where it remained, usually five to ten minutes, until the moisture was driven out of the flong, leaving it baked hard but still flexible.

The matrix, after trimming to a set size, was placed face downwards on a table and all the largest "whites" (that is, the hollows in it corresponding to the spaces between the type) were packed out with pieces of felt, to prevent the weight of the molten metal from forcing the "whites" downwards during the casting.

The thoroughly dried "mat," now ready for casting, would, if the newspaper was one of moderate circulation, be set in a hand-operated casting-box or mould and the stereotype metal either pumped or ladled in. The semicircular plate, when cooled sufficiently, was then taken out, the tail cutting and bevelling done in a second machine, and a third machine, called the boring box, was necessary to shave the ribs at the back of the plate so that it would be of an even thickness all over.

In larger offices, where a great number of castings from each "mat" were required, either the Senior Autoplate or the Junior Autoplate was used. The Senior Autoplate produced the plates entirely mechanically, casting, boring, and bevelling at the rate of about two plates a minute; while the Junior Autoplate, being semi-automatic, only cast and cut off the sprew at approximately the same speed, the remainder being done on the Autoshaver, an entirely separate machine.

Now, having before us this necessarily brief outline of the process as carried on in this country in the year just before the outbreak of the War by nearly all the newspaper foundries, it will be found much easier to trace the progress made both in methods and machinery during the last few years.

Probably the greatest change made in our British newspapers during recent years has been the tendency freely to use half-tone illustrations, and usually at least one page is devoted entirely to this purpose. After allowing due credit to the process engraver, pressman, and others concerned, it is quite safe to say that without the progress made in stereotyping this brightening up of our newspapers would have been impossible.

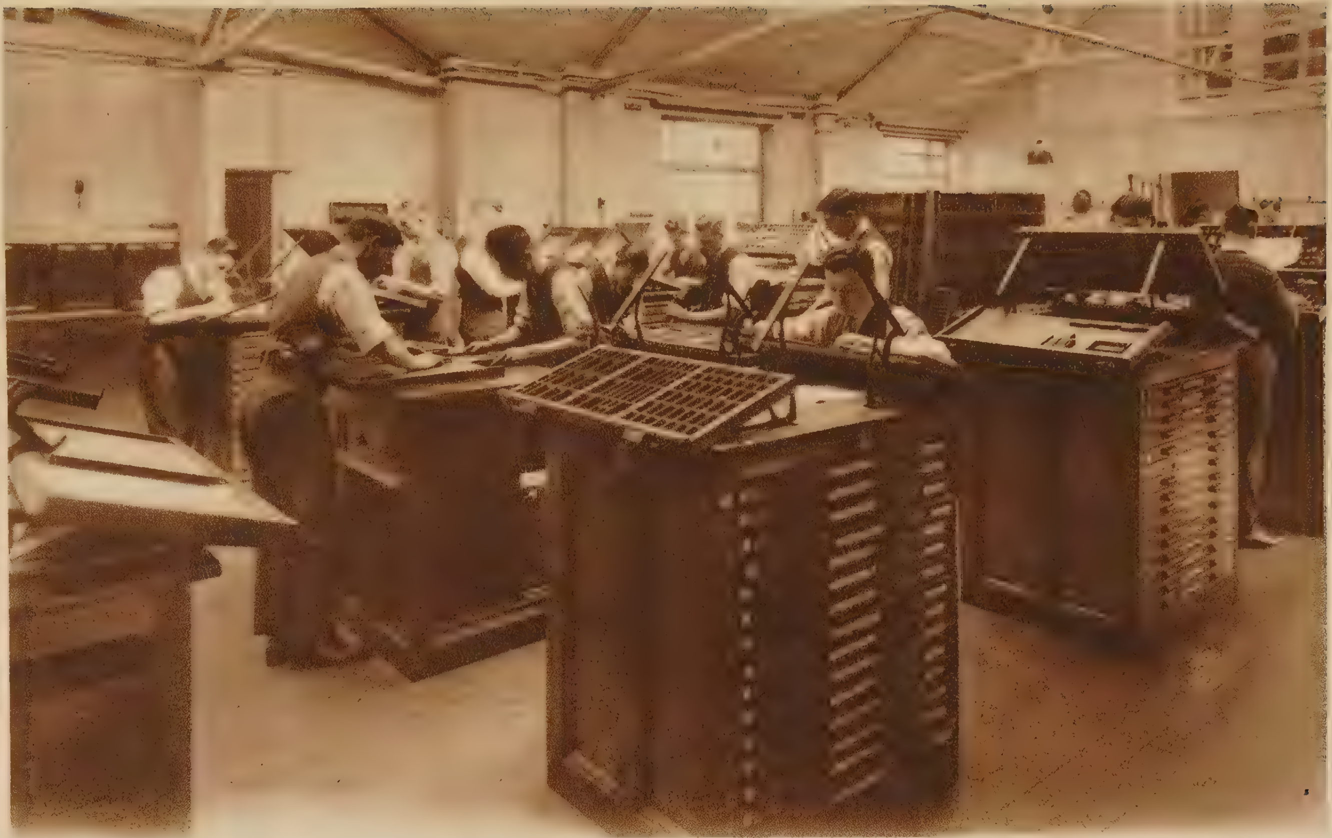
The old wet flong, made up as it was of two or three sheets of tissue and backed with two or more sheets of blotting-paper all pasted together, had to be used in a more or less saturated condition, necessitating a comparatively long time in the steam press to dry. This delay in making the matrix caused some of our leading newspapers to search for a material that could be moulded dry, so cutting out the steam drying press. This method has now become so successful for purely news pages that it would be very difficult to-day to find an up-to-date office using the old wet-flong process.

The dry moulded matrix met the needs of most foundries until the demand for pictures became more insistent, and then it was found wanting. The faces of the plates were not smooth enough, and the flong would not produce the fine dots of the block sufficiently sharp and deep. The stereotyper tried filling in the coarse surface of the flong with various mixtures, called facings, and found that the dry flong again excelled the wet variety, as the porous pulp nature of the former gave a better hold to any facing composition applied. Such progress has been made with the coated dry flongs that a large proportion of our better-class journals and many of our high-class magazines, containing three and four colour work and half-tone blocks up to 150 screen, are to-day being printed, on either flat or rotary machines, from nickel-plated stereos produced in this way.

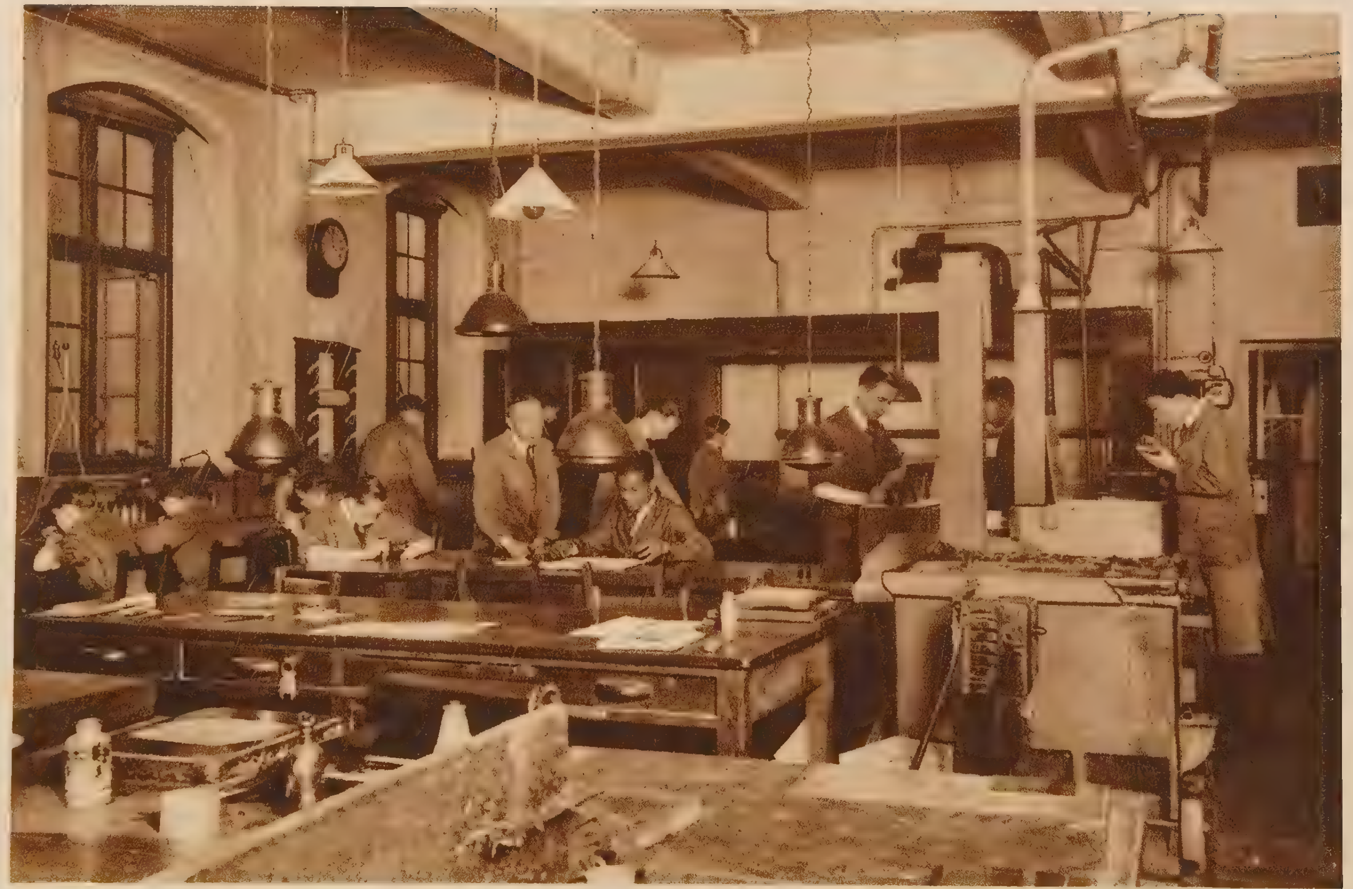
It should be noted that although the newer flong is called dry, a certain degree of humidity is required to be present for dry moulding, and more so for the better class of picture work. Therefore in this latter case the hot press is still used. The raising of the dark shades and lowering of middle tones and high lights of the engraving, called in the trade "bumping," is now practised by every newspaper stereotyper, and there is no doubt that the judicious use of "bumping" the block and the application of a reverse underlay on the back of the "mat," to preserve the effect, are of the greatest importance to the printer.

Many improvements in machinery followed the general adoption of dry flong. The old presses and mangles were not powerful enough to force the dry flong in, and breakages were frequent. Messrs. Hoe and Co. were probably the first to supply a mangle powerful enough to stand up to the work, and later on Linotype and Machinery, Limited, followed with a successful machine, and one or more of these makes will be found in every large office. A newly designed and very powerfully constructed mangle by Messrs. Goss, the Chicago printers' engineers, has just recently been installed in this country and is doing good work. It has several novel features.

Among the recently introduced extremely powerful flat moulding presses, either steam or electrically heated, for the higher class of moulding, where the flong is used in a more or less damp condition, mention may be made of the "Winkler" press (W. J. Light and Co.), in which the power is obtained by cam action providing an automatic pressure release, electric or steam heating, and suction aid to drying; R. Hoe and Co.'s 750-ton hydraulic power press with electric heating, suction drying, and automatic cut-out at any desired pressure, and the



Students in the composing room at the London School of Printing and Kindred Trades, Stamford Street, London.



Students at work etching and engraving line and half-tone plates at the London County Council School of Photo-Engraving and Lithography, Bolt Court, Fleet Street.

"Gigant" hydraulic press (S.A.P., Limited), with electric heating and automatic pressure regulating and cut-out.

Conditioning humidors for infusing the correct amount of moisture into the flong are now available. One in which the sheets are inserted vertically and held by clips in a metal-lined box, the moisture being introduced by means of saturated clay slabs, is sold by W. J. Light and Co. Another very successful type recently produced by L. S. Dixon and Co. provides means for controlling the amount of humidity introduced to a very fine degree, and, moreover, can be added to at small additional cost to accommodate several hundred sheets of flong should an increase of work warrant it. Rotary matrix driers for curving and drying out the moisture completely just previous to placing in the casting machines are made by Winkler (W. J. Light and Co.) and Linotype and Machinery, Limited. The principle is that the matrix is placed inside a perforated cylinder, and the whole revolved at high speed in a closed and heated oven for about thirty seconds. The matrix, by reason of its flexibility and the centrifugal action caused by its rapid revolutions, takes up the desired semicircular shape and retains it. Although this method of drying and curving is generally considered more successful than other methods, there are times (for instance, should buckles occur in the dry-moulded matrix) when the pressure applied by centrifugal action is not sufficient, and Linotype and Machinery, Limited, are now experimenting with an ingenious device to remedy this trouble.

Improvements in detail only have been made in recent years to the Junior Autoplate, but the makers, Linotype and Machinery, Limited, some years ago completely redesigned its companion machine, the Autoshaver, which automatically shaves the back, bevels, finishes, and cools the plate, and will now easily handle the output from two Junior Autoplates.

An interesting casting machine, called the "Winkler," was introduced in 1923 by W. J. Light and Co., Limited, and an improved model was shown at the Printing Trades Exhibition, 1925. The novelty of this machine lies chiefly in the manner in which the metal is delivered to the mould. No pump is used, but the orifice of the closed mould with the matrix in position is brought into close contact with the outlet of a long valve, forming part of the actual metal-pot, which opens, allowing the metal to flow into the mould. The valve then closes and the mould opens, exposing the plate tilted in a position ready to be taken away by hand. The whole operation is automatic, and it is claimed by the makers that, as the plate is actually die cast, no shaving is required. The output is said to be three plates a minute. Flat-plate casting machines are also made on the same principle.

For smaller offices the Pony Autoplate, produced in 1924 by Linotype and Machinery, Limited, is finding favour. In this machine the plate is cast, shaved, and cooled. The matrix, coming away with every casting, is reset by simply dropping it into slots provided for the purpose. This is a distinct advantage where only a few casts from each "mat" are required, for the changing of one "mat" for another takes only about five seconds.

A rather more ambitious casting machine has been placed on the market recently by Messrs. Crabtree, Limited, somewhat similar to the Pony Autoplate, but in this case the matrix remains in position when the plate is withdrawn, and the movement of the plate for shaving and cooling is done mechanically.

Quite the latest casting machine, called the Automatic Junior Autoplate, has just been installed by Linotype and Machinery, Limited, at the offices of the *Daily Mail*. This machine is virtually a power-driven Junior Autoplate, and cuts out the hand operation entirely. By a simple arrangement it can be set to cast any required number of plates. The push of a button starts it casting at the remarkable speed of four large news plates a minute, ready for finishing on the Autoshaver, and when the number required is complete it automatically stops.

Many further improvements in stereotyping are being tested, some of which no doubt will be of value. A. H. H.

CHAPTER VII

THE USE OF GAS IN PRINTING

LIGHT, POWER, AND HEAT

Gas in the printing and newspaper industry! What a theme to bring to a veteran printer's recollection of the enormous changes which have taken place in the production of newspapers and other printed matter during the past fifty years!

In those far-off days the sign "Steam Printing Works" was a sure indication of the most up-to-date plant within. The small printing works still relied entirely, as in Caxton's day, upon man-power. The use of steam, however, was adopted in the larger printing works, as it was the only method for speedy and satisfactory results. The writer of these lines well remembers, when he began his novitiate to this wonderful craft, that his firm had a cylinder printing machine which was operated, laboriously and tediously, by hand.

Gas in those days was only used as a method of illumination, but it was hardly worthy of the dignity of such a description. Bare fish-tail burners flamed away, and if one attempted to regulate them by means of the tap more often than not the flame vanished altogether. Ventilation in printing offices was not a leading feature in the early eighties of last century, and the air was never too pure. When the gas was "regulated" it was decidedly worse.

Nevertheless, it was in this direction that the gas industry first rose to the occasion, and so admirable were the results of their successive experiments and research work that to-day almost any printer will tell you that he prefers to work by gaslight rather than by any other artificial illuminant. From the fish-tail developed, year by year, new and better burners, and ultimately the incandescent mantle arrived. To-day, in its most modern form, and with the added advantage of long-distance switches, compositors in the works with which the writer is connected say that nothing can equal the light gas gives for softness and well-diffused power.

The provision of light, although important to men to whom good vision means so much, is in reality only the least direction in which gas has helped the printer. It is in the matter of power, and of providing an ever-ready, easily used and unvarying source of heat that it has helped us most. The writer well remembers when the first gas engine was installed in his works. This was one of the earliest engines of the type invented by Dr. Otto with a very tall vertical cylinder, open at the top, and driven by means of an ingenious clutch gear during the down stroke of the piston. It was tucked away in a corner, and did its best until the growth of the plant called for a horizontal engine of greater power. With the gradual enlargement of the works with which the writer has been connected for almost half a century, there has been a similar increase in the use of gas power. First used some forty years ago for the one ridiculous-looking machine already mentioned, to-day modern gas engines of large size supply the power for more than fifty machines of varied uses which are to be found in an up-to-date printing works. Tests from time to time have convinced the proprietors that the power provided in this manner is most economical—and that in a district where the price is comparatively high.

The invention of the Linotype machine by Ottman Mergenthaler in the eighties, the first typesetting machine of real utility and efficiency, revolutionized the printing industry. Forty years ago men laughed at the idea of being able to set type by machinery. Since the middle of the fifteenth century type had been set by hand, and by that means it would still be set, argued the men proud of their craft and its traditions, and, maybe, a little jealous of the advent of a complicated piece of mechanism which, it was said, would do their work in less time, with fewer mistakes and at smaller cost. It was regarded as being impossible, and printers generally were very slow in taking up the idea. But ten years after the first machine was put on the market we installed one—its number was among the first 500—and gas again lent its powerful aid, this time for heating the melting-pot. No other means would have availed.

To-day every printing office of any size has typesetting machines, in "banks" or in small numbers, for the industry could not do without them. When one thinks of the thousands of such machines, Linotypes and Monotypes, operating to-day throughout the country, and realizes that gas is an essential element in connexion with one and all, the word "need" might well be substituted for "use" in the term "use of gas in the printing industry."

Another great change from olden days has come in the printing of newspapers and other publications of which large numbers are required. In my younger days these were printed straight from the type, which the compositors had set by hand, on a flat-bed machine. The invention of the rotary machine abolished that lengthy and toilsome method, and here again gas became essential—in baking the matrices of the pages and in heating the metal for the casting of the curved plates.

In all these operations the two great essentials are continuity of supply and uniformity of heat in order that the best results may be obtained, and it speaks volumes for the standard attained by the gas industry that in the case of all the leading London newspapers, and most of the provincial publications, gas is adopted for all the processes requiring heat. *The Times*, the *Daily Mail* and its associated papers, the *Daily Telegraph*, the *Daily Chronicle*, the *Evening News*, the *Star*, the *Daily Mirror*, the *Daily Sketch*, the *Evening Standard*, the *Daily Express*, and the *News of the World*—all have in their printing works gas-fired Junior Autoplate machines with gas-fired seven-ton pots.

Moreover, the gas industry is not content with bringing about this universal change-over from solid to gaseous fuel; improvements are continually being made in the application of gas to printing. Proof of the rapid increase in the efficiency of the melting operation lies in the fact that, whereas a short time ago only three to five pounds of metal could be melted per cubic foot of gas used, to-day from nine to ten pounds can be melted with the same consumption. The gas-furnace is now the printer's best friend—the excellent type of friend whose dependability grows with the increase of demands made upon his services.

PART IX

PAPER AND INK

CHAPTER I

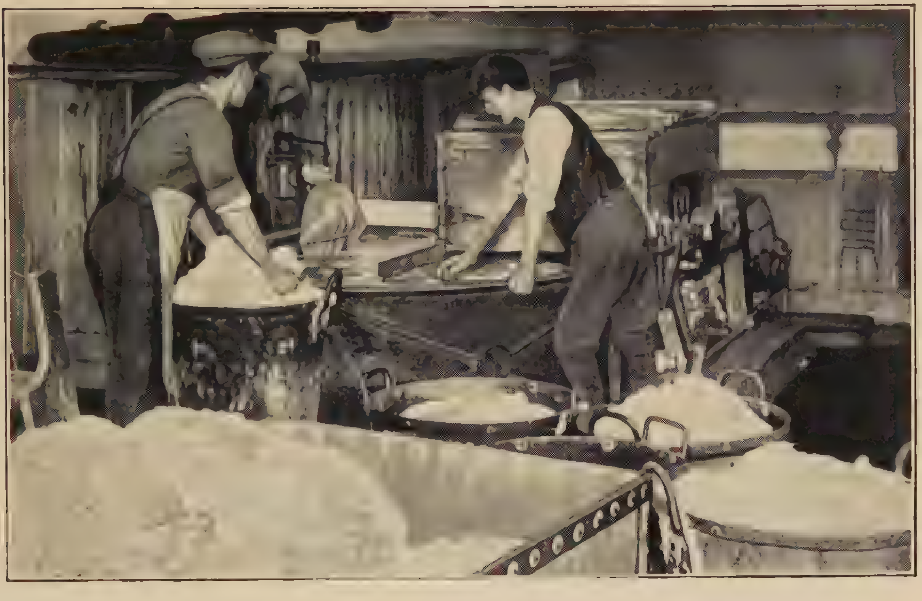
WOOD PULP FOR PAPER

METHODS OF MANUFACTURE

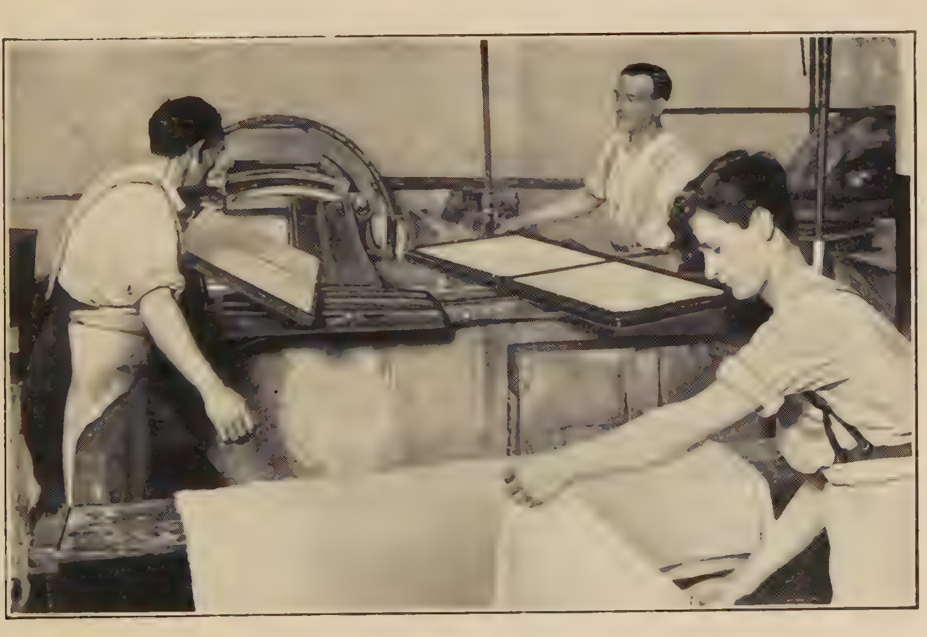
It is one of the wonders of an age of wonders that a log of hewn timber grown on the mountain heights of Scandinavia should within a brief period of eight days bear current tidings in the form of a newspaper available in the streets of Great Britain. The remotest origins of paper and its method of manufacture are veiled in mystery. The raw materials which will be employed in the future are also speculative, on account of the advance of modern science. Whereas the past is somewhat legendary, the future, in the light of scientific achievement, is a matter of conjecture. Before the advent of wood pulp cotton fibre was the principal basic raw material for paper-making, and fine writing papers, in the manufacture of which Great Britain holds first place, are still produced from cotton and linen rags and waste cuttings from the textile factories. The demand for newsprint has naturally outstripped that for all other kinds of paper, and therefore the use of wood for paper-making is now far in excess of any other commodity.

The principal trees used for the production of wood pulp are spruce and fir, the former producing by far the best results. Fir contains a larger percentage of resin, which has to be disposed of, and is rather troublesome to eliminate entirely. Fir trees, however, are quite suitable for pulp used in the manufacture of strong wrapping and other papers where pure white pulp is not an essential feature.

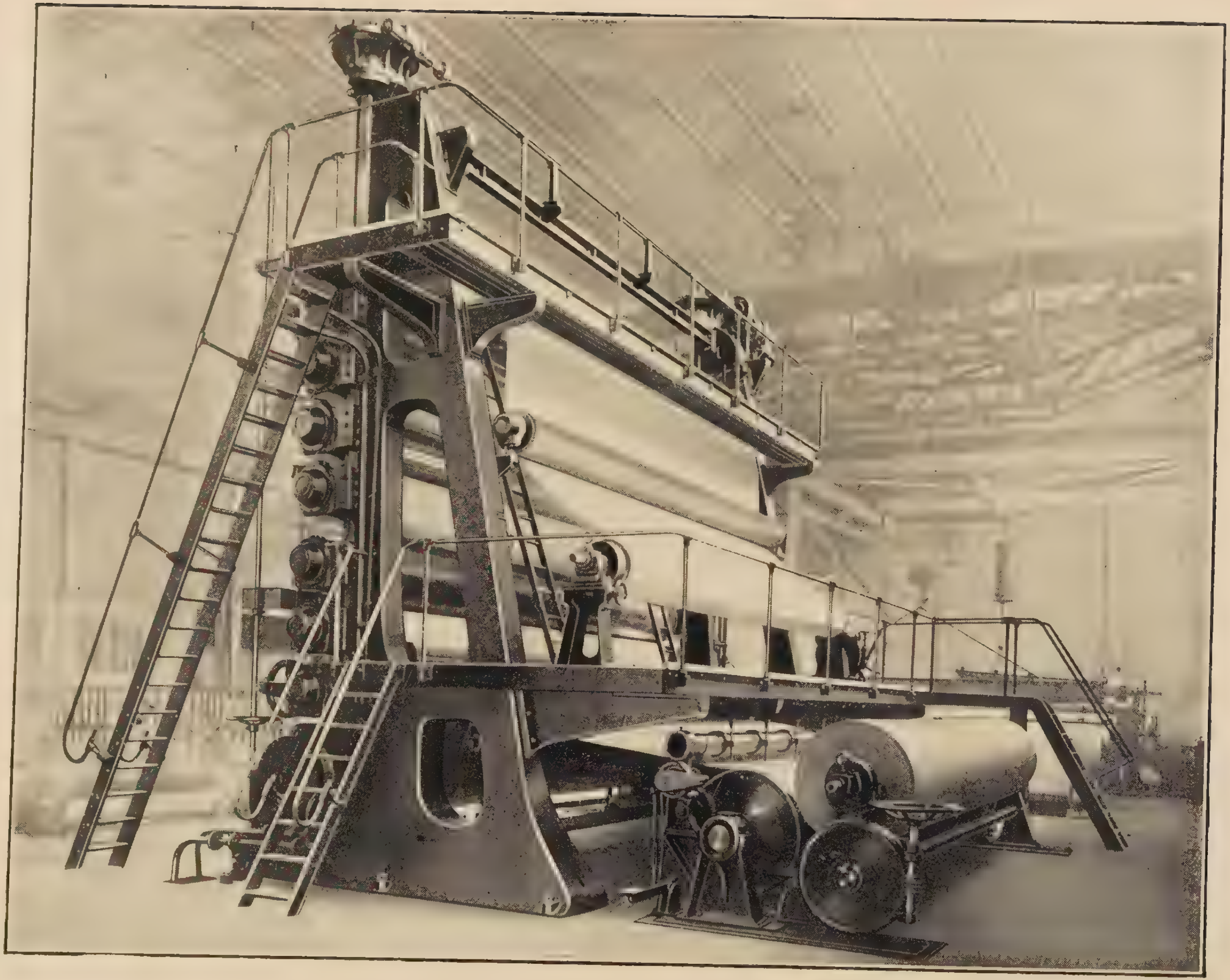
There are two principal kinds of wood pulp—mechanical and sulphite. Sulphate and soda pulps are adjuncts to the latter, both being treated with different or additional chemical actions. Sulphate



Making hand-made paper.—A corner of the beating and pulping room at the Batchelor Mill, Little Chart.



Dipping moulds in the vat house at Little Chart.



One of the largest super-calenders in the world, which has been built for Bowater's Paper Mills, Northfleet, Kent, by Charles Walmsley and Co. It is capable of treating paper 245in. trimmed width at a speed of 1,600ft. a minute.

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pulp is used for strong wrapping papers, and soda pulp for those printing papers which are specially suitable for the production of pictures.

The production of mechanical pulp is effected by cutting up the logs into certain lengths, after the bark has been taken off, and grinding them in water in a longitudinal direction under pressure by a rotary grindstone. The wood is thus disintegrated, but the component fibres remain in the water. The ground pulp is then filtered or separated in straining appliances, and made up into the form of sheets by passing it over a rotary wire mesh, similar to that used on paper-making machines. It is then partially dried and pressed in a continuous process by passing it through rollers, and is usually shipped with a content of 50 per cent. moisture.

In the production of sulphite or chemical pulp, including sulphate or soda pulp, the logs are chipped up into small pieces, and subjected to a very minute sorting process, which eliminates all the knots in the wood, and any pieces of damaged wood or bark, &c., which would have the effect of discolouring the finished product. These chips are boiled in a strong solution of acid calcium di-sulphite, which is produced from sulphur and pyrites or limestone. The chips are boiled in this chemical solution for several hours, which has the effect of eliminating the residue out of the wood, and preserving only the fibres or cellulose.

For fine papers sulphite pulp is used without any mechanical pulp, and is sometimes also submitted to a bleaching process, for which a separate bleaching plant is employed. For the cheaper qualities of printing papers and for newsprint, mechanical pulp is used with a mixture of anything between 20 per cent. and 60 per cent. of sulphite pulp, according to the quality required.

Scientists have estimated that the pulp supplies of the world will be exhausted within the next twenty-five years. It is interesting in this connexion to realize that experiments are being made on the cereal straws of Western Canada. The first practical work done in connexion with the utilization of this wasted product was the manufacture of paper from flax straw. The position suggests that necessity may once again prove the mother of invention. The United States, once the leading pulp-producing country, now produces less than one-half its requirements of newsprint, and Canada is reported to send to the United States nearly 90 per cent. of its total import. The Dominion authorities, following the excellent example of the Scandinavian Governments, are establishing a closer liaison between science and nature. Research of a technical character is being expedited and the potentialities of afforestation more completely explored.

It is estimated that Sweden possesses in forest land an equivalent to something over one-half the whole area of the country, and over six times the area of cultivated land. Pine and fir trees predominate, and of the annual yield 50 per cent. of the timber is exported as unworked timber, sawn and worked timber, and for the manufacture of wood pulp, the rest being used for mining purposes and for other requirements in Sweden itself.

It was in Norway that the new manufacturing methods of the latter part of the last century for converting timber into pulp by chemical processes first came into favour, and to-day the pulp and paper industry in Norway represents about 50 per cent. of the total Norwegian export. Norway is in close proximity to many great centres of consumption, and the Norwegians, owing to the fact that their ports are never icebound, are able to ship during the whole year. The Norwegian forests cover about one-quarter of the country's total surface. Of this timber 80 per cent. represents various species of pinewood. Of the total quantity of pine, roughly two-thirds are spruce, which is the best wood for conversion into cellulose. The Norwegian pulp industry is helped by the abundant supply of cheap water power, especially vital in the industry of bleached sulphite.

In Finland the area of forest land is 18.3 acres per head of population. Rich in her abundance of water and rapids, Finland's principal wealth is drawn from her forests. The composition of the forests is about 55 per cent. pine, 25 per cent. spruce, and 18.6 per cent. broadleaf trees. Of the total water power in Finland, about one-third is State-owned, and two-thirds are controlled by the industries and power-station establishments.

Poland also has a large export of wood for pulp-making. There are enormous forest areas as yet untouched in Northern Russia. In time these supplies may find their way into European markets.

E. S. L.

CHAPTER II

ART-PAPER MAKING

COATING AND CALENDERING

There has been an increasing demand for art papers in recent years and one has only to glance along the shelves of any bookstall to realize the truth of this statement. The outer coverings of books are usually made of art paper, showing brilliantly coloured titles and illustrations to attract the eye of the purchaser. Art paper, owing to its peculiar suitability, is largely used for illustrated magazines, catalogues, &c., where accurate reproduction and fineness of detail are essential features.

Art paper, sometimes termed "coated paper," has a substratum of mineral matter combined with a colloidal vehicle and adhesive and other ingredients, applied to one or both sides of the paper. The various substances used to make up the coating mixture require careful adjustment in order to produce a surface of correct receptivity to the printing inks and to the colours used in the printing processes so that colour reproductions and the dots in the "half-tone" process will be reproduced with the clearest possible definition and accuracy. The development of the manufacture of art paper has arisen chiefly owing to the demand of the printer for a paper that would fulfil the requirements of the half-tone process.

The necessary characteristics of the body paper supporting the coating mixture are flexibility, flatness, uniformity of make, freedom from fibres of microscopic dimensions protruding from the paper surface, &c. Also the "sizing" property, or the degree of paper absorbency, must be such that the paper will have the correct receptivity to the coating mixture. The quantity of resin and alum used, together with the degree of beating the fibres, are the chief factors in producing a paper having the correct sizing property.

A considerable proportion of esparto grass is used in the make-up of the body paper, as this type of fibre has certain characteristics which render it suitable for the art coating process.

In the preparation of the coating mixture the following mineral substances may be employed: Satin white, china clay, baryta, and talc, together with a suitable carrier and adhesive such as casein, gelatine, or starch. The proportions of the mineral substances and adhesives are adjusted according to the type of surface desired.

The usual surfaces produced are known as matt, semi-matt, chromo, glossy, &c. Baryta or blanc fixe is a white mineral pigment known chemically as barium sulphate and is bought in the paste form; the degree of granularity of the baryta and the quantity added has an influence on the type of surface desired, and the size of the granules in the manufacture of the baryta is controlled during the precipitation process. China clay and talc, described chemically as hydrated aluminium silicate and magnesium silicate respectively, are bought in lump and powdered forms. The satin white may also be bought in the form of a paste, but in large and modern coating factories satin white is produced synthetically from lime and alum, the reaction products being calcium sulphate and aluminium hydroxide. After removal of the surplus water by filter pressing, the white paste is known commercially as satin white. Casein, the albuminoid of milk, is prepared on a commercial scale by the addition of acid, or the enzyme rennet, to skimmed milk, and the casein precipitated in the form of a curd. The curd is separated and dried, and sold in the form of a pale yellowish powder. Casein swells in water but is insoluble, and requires the aid of an alkali to bring it into solution. Gelatine belongs to the sub-group of proteins and is derived chiefly from skins, tissues, and bones; it may be bought as a powder or in sheet form, and is rendered soluble by treatment with hot water.

The various minerals, adhesives, and auxiliary ingredients, such as waxes, oil, soap, preservatives, hardening agents, and dyestuffs, are thoroughly incorporated by careful agitation to produce a more or less homogeneous mixture, the temperature and consistency of the mixture being carefully regulated. The proportions of the various substances used in the mixture must be adjusted so that when the paper is coated the surface will not be too hard and resistant to cause slow drying of the printing inks and create off-setting trouble during printing. On the other hand, the surface must not be too soft, or "picking" trouble may arise, causing a brokenness of the type during printing, due to particles of the coating adhering to the face of the type and printing plates. The mineral matter must be free from gritty particles, or trouble may arise during lithographic printing, due to the grit etching the stones or plates used.

Tiny air-bells and bubbles must be allowed to escape from the mixture, or minute depressions or craters will be formed on the surface of the coated paper. Although these depressions may be so small as to be hardly perceptible to the naked eye, a brokenness will be caused on printing, due to the dots in the half-tone process being irregularly formed, and the reproduction will consequently have a dull and flat appearance. This defect may also occur if the body paper itself is too hard and resistant, as the air locked up in the paper is unable to escape quickly enough during the drying operation.

The tiny fibres protruding from the paper surface, previously referred to, collect an excess of the coating mixture, making the coating relatively thicker at those parts and thereby causing lumpiness on matt and semi-matt papers, and when the paper is calendered for glossy surfaces the thicker parts receive relatively more pressure than the rest of the sheet and a mottled effect is produced. On looking through the paper by the aid of transmitted light, the thicker portions show up as dark spots.

While the roll of body paper is being unwound, the mixture is applied to either one or both sides as desired in one continuous operation. The coating liquid is fed into a warm water-jacketed trough in which revolves a roller. The roller may be felt-jacketed or covered by an endless felt, or the roller may transfer the coating liquid to another roller or felt. In certain machines a brush roller may be used in place of the top roller. The mixture is taken up from the trough by the bottom roller and is then transferred to the paper, and the quantity applied is controlled by the adjustment of the roller and by the consistency of the mixture. The paper is then led over a smooth-faced hollow drum, between a series of stationary and jigging brushes, which spread the mixture evenly over the paper surface. The hairs of the brushes are of varying degree of hardness—the soft brushes are usually made from camel hair. Care must be exercised at this stage to avoid streaks and brush markings on the coated surface. After leaving the coating drum the underside, or uncoated side, of the paper may be dragged over a damp felt to prevent the paper from curling.

The coated paper, suspended on wooden rods, is next carried along a track by overhead chains, the paper hanging in the form of loops. Hot air, preferably filtered to ensure freedom from dust particles, is blown into the track and the paper is dried as it travels along. This is known as the "Festoon" method of drying. The paper is then reeled up and may receive another application of coating, if desired. The paper may also be coated on both sides continuously during one operation by a specially designed double coating machine. The drying operation requires careful control, and afterwards the paper is matured or humidified to allow it to absorb its natural moisture content, so that the coated paper will be amenable to the calendering operation. The humidification treatment at the same time aids the paper to lie flat. Paper which is too dry and has not been properly matured is more susceptible to changes in atmospheric humidity, and consequently will be liable to alter in register and produce waviness and cockling trouble. The manufacture of a well-matured, flat and even art paper is one of prime importance to the printer, especially in the production of three or four colour work, where accurate register is an essential characteristic.

When a glossy surface is required the paper is passed through a stack of calenders, consisting of a number of heavy rolls, some of which are steel and others composed of compressed cotton. The degree of smoothness or finish imparted to the paper depends upon the pressure of the rollers and the number of nips given during calendering. If a very high gloss is desired the coated paper, before calendering, may be passed over a brushing machine having brush rollers revolving at high speed against the coated surface.

Linen and fancy finishes can be produced by pressing the coated paper against appropriate surfaces to give the necessary impress: linen finish is obtained by pressing the paper against linen; and surfaces of fanciful design by pressing against specially designed embossing rolls. Embossed surfaces have a pleasing effect, as the minute shadows created on the surface tend to break up the reflected light and enhance in certain instances the appearance of the reproduction. Coated papers having a matt surface are uncalendered, and semi-matt and chromo papers may be only very slightly calendered.

Art coated paper, owing to the peculiar affinity and receptivity of its surface to the dyes and printing inks employed, stands out pre-eminently as a medium in producing purity and evenness of tone and in accurately reproducing type and the fine detail of the printing plates.

Many variable factors of a somewhat empirical nature arise in the manufacture of the body and coated paper; and as each process is more or less interdependent, the utmost experience, skill, and judgment are necessary from the initial treatment of the raw materials to the final finishing process. Therefore, every process must be carefully and scientifically controlled and operated by men of experience who fully understand and appreciate the technique and art of paper-making and art coating.

J. S. A.

CHAPTER III

NEWSPRINT

PRODUCT OF BRITISH MILLS

Newsprint is so much an every-day matter that scarcely a thought is given to the means by which it is produced. The process of its manufacture is, however, of peculiar interest, and the industry itself is one of the very highest importance, in view of the fact that the English newsprint manufacturers annually produce 640,000 tons, and in addition there is imported into this country from Canada, Newfoundland, and Scandinavian countries 320,000 tons per annum. The yearly consumption of newsprint in the British Isles, excluding Ireland, totals 880,000 tons. It will be seen, therefore, that nearly two-thirds of the newsprint consumed in these islands is the product of British paper mills, while the balance of the output is exported to all parts of the globe. The reputation of the British paper-maker for quality stands unrivalled.

The main ingredient of newsprint to-day is wood pulp. On arrival at the paper mills the dry sheets of wood pulp are reduced to wet pulp by being fed into "potchers" fitted with very heavy revolving rolls which separate the fibres of the pulp and mix them intimately with water. At this stage certain other ingredients—blue dye to enhance the paper's whiteness, size to render ink less liable to "run" on it, alum, and (when a fine surface is desired on the finished paper) liquid china clay, carefully strained—are added to the fluid pulp. On emerging from the "potchers" the pulp, which by this time is about the consistency of, and very much resembles, thick oatmeal porridge, undergoes a number of refining processes, the chief purpose being to remove any impurities or foreign matter, especially any lumps of the original pulp which have not been perfectly reduced to separate fibres. The mixture is then run off into storage tanks, in which it is kept in continual motion—*i.e.*, is not allowed to "settle."

When the actual making of paper begins a certain quantity of the mixture is drawn off from the storage tank, diluted again with a large percentage of water, and once more carefully strained.

The fine fluid, looking now like very thin milk or very soapy water, is next allowed to flow over the moving wire frame which is at the so-called "wet end" of the paper-machine. Two rubber bands, called "deckle-straps," one at either side, prevent the pulp from running off the wire frame. The network of the frame is very fine, and its movement is peculiar. It is in the form of an endless band and is carried forward continuously, while at the same time a very rapid jerking or rocking movement, from side to side, is imparted to it. By this rocking movement the fibres of wood held in suspension in the milky fluid, all at first more or less pointing in the direction in which the fluid is flowing, are caused to fall across each other in various directions.

It is this interlacing or "felting" of the fibres which constitutes the beginning of actual paper-making. While this "felting" is going on, the water is falling through the wire mesh, leaving the wet and interlaced fibres on top. As the wet mixture of fibres is carried forward on the wire band yet more water is extracted from it by the suction of a series of vacuum boxes, and it then passes, still on its wire band, between two sets of rollers, mangle-fashion, which squeeze it ever drier.

Although still very wet and soft, the film of mixture is now paper, just strong enough to hang together for the instant while it is pricked off the wire at the last roll and transferred to the soft woollen felt cloths which carry it forward through further sets of rollers which squeeze the remaining water from it and press the interlaced fibres into a more and more compact sheet. Continuing its forward movement, the sheet now passes round a series of drying cylinders heated within by steam, and its manufacture is completed by a final passage through pairs of very heavy smoothing rolls, which gives it the necessary fineness of surface.

As it comes off the machine the finished paper is wound up into large rolls. It is, of course, the full width of the machine, sometimes as wide as 230 inches if it be one of the largest sizes; too wide usually for commercial purposes. Each big roll, therefore, is put on to a rewinding machine and cut into two or three smaller reels of whatever widths are required for the printing machine. While this rewinding is going on the paper is carefully watched for blemishes, and when detected the machine is stopped, the faulty portion removed, the two ends of paper joined up, and the rewinding resumed.

The newsprint-making process is a very rapid one in view of the fact that some of the latest machines (which are entirely of British manufacture) are running at 900ft. a minute, and the average output for a machine of this width exceeds 500 tons of 2,240lb. per 136-hour week. It should be added that the machines run continuously from Monday morning to Saturday night, and in most cases are electrically driven.

CHAPTER IV

PRINTING INKS

CLASSIFICATION AND MANUFACTURE

The manufacture of printing inks requires, in the first place, a very careful selection of suitable materials, which must be continually submitted to such chemical and physical tests as will ensure a reliable and uniform product at a later stage; secondly, the skilful manipulation of all the ingredients and the processes through which they pass; and, lastly, the judicious application of the inks to the particular requirements of the printer.

The different methods and processes of printing, and the various kinds of surface printed, call for inks of corresponding diversity, but it is only possible in this article to give a brief account of the more important, which may be classified conveniently according to the methods in which they are used.

Fundamentally there are three distinct methods of printing, namely:—

1. Printing from a raised surface (letterpress), such as a forme of type or plates in relief.
2. Printing from the flat surface of a prepared stone or metal, such as a lithographic stone or a plate designed for offset printing.
3. Printing from an engraved or etched surface (intaglio).

The three different types of ink designed for the above processes have to be modified considerably according to the surface upon which they will be printed—*e.g.*, the various grades of paper stock, cover-paper, cardboard, parchment, linen, silk, wood, leather, rubber, tin, celluloid, and other materials.

The general principle underlying the manufacture of a printing ink is the incorporation of a pigment with a suitable varnish medium, and such "dryers" and accessories as are necessary to adapt the ink to the requirements of the printing machine and the surface to be printed. The materials are first thoroughly mixed in the proportion necessary to produce the correct consistency and finally ground to a high degree of fineness or smoothness by passing several times through a roller mill. These rolls, which may be chilled iron, porphyry, or granite, are geared to run at different speeds, and in some cases have a lateral motion also, so that the thin film of material passing over their surfaces is subjected to a very great shearing pressure. The particles of the pigment are thus reduced to a size of the order of one ten-thousandth of a millimetre and can then no longer be distinguished from the medium in which they are ground, and the mass has a perfectly smooth appearance. The rolls are water-cooled to prevent injury to the colours and variations of consistency which might result from over-heating.

Before considering the different types of ink in further detail, a few words on the subject of drying are necessary. Inks may be said to dry in three different ways: (1) By absorption into the surface on which they are printed; (2) by oxidation of the thin film, which gradually gelatinizes and becomes covered with a dry skin; or (3) by evaporation when the ink contains some volatile solvent as one of its ingredients. In many cases two or more of these processes may go on simultaneously, but when the paper is very porous the ink may dry by absorption only. Such is the case, for example, with news inks, which are included among the inks of the first type in our classification.

The pigment in these inks is usually one of the carbon blacks produced from the incomplete combustion of natural gas, and although this has very great tinctorial strength, it would show a somewhat brownish undertone in the very thin film of ink used in printing but for the addition of a little bluish dye which corrects the colour and intensifies the effect. Owing to the present speed of production and the thinner and more absorbent papers in use, the varnish medium for news inks is usually a blend of mineral oil and rosin rather than the oil from the destructive distillation of rosin formerly employed. The materials are well mixed and finely ground, the consistency being adapted to the speed of the press so that clean and sharp impressions may result from type and coarse-screen half-tones on news stock.

Many different types of black and coloured inks are made to provide for all kinds of typographic or letterpress printing, but the varnish medium in most cases is manufactured from linseed oil which has been previously thickened to the necessary consistency by boiling at a high temperature. The drying of this vehicle is capable of being accelerated by the addition of certain metallic compounds called "dryers," and this is necessary with certain pigments which have a retarding effect, particularly blacks.

The coloured pigments in general use, apart from a few inorganic substances such as chrome yellows, bronze blues, and ultramarines, are prepared from aniline dyes precipitated on a metallic base such as alumina and blanc fixe, and there is now available a great variety of bright and attractive shades possessing considerable fastness to light and other valuable properties. Among the most interesting inks of this class are those used for the three-colour process, which requires a yellow, red, and blue ink complementary in hue to the photographic colour-filters used in preparing the blocks. As close an approximation as possible to the theoretical colours is obtained, having regard to a reasonable degree of fastness to light and suitable transparency. The yellow ink is usually printed first in this country, and is opaque, while the red and finally the blue are more transparent. The drying properties of these inks must receive considerable attention, as if the yellow ink dries too quickly it will be found difficult to get the red ink to adhere to it, and the same applies to the blue. Each colour should therefore be almost, but not quite, dry when the next is superimposed. Generally it is preferred that trichromatic inks should be slow in drying, so that they may pick up without difficulty after an interval of a day or two if it should be necessary to postpone the printing of the second and third colours, especially as dryers, if required, can be added more safely than materials of a non-drying character. The elimination of sticking and offset is accomplished by careful make-ready and by carrying just enough ink to cover the solids; clean and satisfactory results are obtained by good make-ready, suitable rollers, and the minimum amount of first-class ink. Another useful class of ink for illustrations is the double-tone ink which is produced by grinding pigments into a dyed varnish of different hue. Owing to the absorption of the vehicle by the paper, the colour of the half-tones of the picture appears different from that of the more heavily inked portions, giving somewhat the effect of two impressions.

Inks of the second type in our classification are manufactured for the various lithographic processes, such as stone lithography, rotary offset presses, printing on tin by the offset method, the dry process of offset printing, and the collotype method of printing from a plate having a gelatinized surface. These inks are stouter in consistency and have a larger proportion of pigment than those supplied for letterpress printing, as it is a long-standing custom with most lithographers to reduce their inks themselves. The colours used in these inks must not run in water, as they come in contact with the water-rollers used to prevent the inking of the level surface on which the design is drawn. For offset printing, where the impression is taken from a rubber blanket, and the film of ink carried is very thin, the colour must be of considerable strength, not bleeding in water or oil, and the consistency soft to provide for high-speed printing on a rotary press.

Beautiful results are being obtained on all kinds of surfaces at great speed by the offset process, and not the least contributory factor to its success is the careful selection and manipulation of all the materials entering into the manufacture of offset inks. If the inks are for printing on tin, they must also stand a stoving temperature of 140deg. to 160deg. F. for several hours without discoloration or any tendency to crack when the tins are bent into shape. In the dry offset process the damping feature is eliminated by etching the plate somewhat deeper, but the need for maximum colour strength is the same, as the ink is transferred from rubber blanket to paper.

The collotype process of surface printing requires a modified form of lithographic ink, but while the quality must be good it is equally important that the room in which the work is done should be of a warm, dry, and even temperature both day and night.

The third type of ink is for use on intaglio or etched surfaces, and includes inks made for printing from steel and copper engraved plates or cylinders. The important rotagravure inks belong to this class, and they are used in producing pictorial printing from etched copper surfaces on a high-speed rotary intaglio perfecting press. These inks are very thin and spirituous, drying almost instantaneously by evaporation of the solvent. They readily fill all the fine cells in the etched copper cylinder, while the surplus ink is cleanly scraped from the surface by a steel blade or "doctor." The adaptation of thin copper engraved plates in place of the older engraved deposited cylinders has greatly reduced the cost of this process, while the ink manufacturer has surmounted the technical difficulties in producing inks suited to its exacting requirements, with the result that rotagravure is capable of producing beautiful pictorial results with pure high lights, true middle tones, and colour depth in the solids which cannot be approached by any other method of printing.

These few examples of some of the more important types of printing ink will serve to illustrate how many and diverse are the requirements which the ink manufacturer is called upon to meet, and to emphasize the importance of his close cooperation with the printer in order fully to appreciate and satisfy these requirements as they arise. E. S. H.

MILOSLAV NOVOTNÝ

SVÍZELE BIBLIOGRAFOVY

POVÍDKA PRO BIBLIOFILY

V PRAZE

1928

Miloslav Novotný's “Svízele Bibliografovy” (Prague, Prumyslová Tiskárna, 1928).

PART X
PRINTING ABROAD

CHAPTER I
BELGIUM AND CZECHOSLOVAKIA

Printing and lithography have made great progress in Belgium since the War. Indeed, every effort seems to have been made to make up for lost time. So far as printing machinery is concerned, Belgium, it is true, relies mainly upon the production of foreign countries, and notably England, Germany, and Switzerland. The daily newspapers, which before the War were not illustrated, are to-day gay with pictures. If the art of newspaper illustration has not yet reached the high standard that has been attained in Great Britain, Germany, and Holland, that is largely because the newsprint employed is mediocre in quality and does not easily lend itself to the reproduction of photo-engravings.

The *bi-quotidien* journal, *La Métropole*, founded in 1894, ranks among the best illustrated papers in Belgium, while in *Le Soir Illustré* the country has possessed during the past two years a weekly journal in which a special feature is the reproduction of photographic engravings. The latter is based on the American example, and in make-up follows closely the form of the daily papers. The provincial Press seems to have made even greater progress than the Press of the capital. For example, *La Meuse*, of Liége, has been materially improved, and new rotary machines from Great Britain have been installed. There is no counterpart in Belgium to the English magazine, and the *revue d'art* no longer exists, for the country is literally invaded with French reviews. On the other hand, the printer Buschman, of Antwerp, has devoted himself with marked success to the reproduction of pictures, and he works in association with the Société d'Art Flamand et Hollandais.

Although the printing houses of Belgium have shown great activity for the last eight or nine years, there is great difficulty in finding expert craftsmen, and the problem of establishing a system of apprenticeship is becoming acute. Belgian printers work not only for their own country but also for foreign publishers. Many foreign books are produced in the printing house of Auguste Bénard of Liége, and the Imprimerie Sainte Cathérine at Bruges prints many volumes for important French publishing houses. Preference is often given to them, at equal or even higher prices, on account of the excellent quality of their work. At the time of writing no fewer than seventeen novels are being printed at these works for French publishing firms. The Maison Thone of Liége, as well as the Maison Goossens and the Maison Vroment of Brussels, specialize in *éditions de luxe* and *demi-luxe*, and this class of work is the principal occupation of Desclée de Brouwer of Bruges.

A great effort is at the present time being made to raise the art of book-making to a standard of excellence which was never reached in Belgium before the War. An interesting review, *L'Art Vivant*, has been founded, and several important associations of book-lovers have recently been formed. Among them are the Société des Bibliophiles, Les Cinquante, L'Union Liégeoise du Livre, and Les Bibliophiles Flamands, whose activities are directed to the reproduction of ancient texts, or of *éditions de grand luxe* of the works of modern Belgian authors, illustrated by Belgian artists. Another recent development is the reprinting in miniature of well-known books, the reproductions being in colour, an art which formerly was exclusively Viennese. Six volumes have appeared since 1923. The Goossens printing works have been equipped for this class of book production; and for the past two years the most suitable quality of ink and of paper has been the subject of careful study. The purchasers of books *de grand luxe* are growing in number in Belgium, and in this domain the Belgian printers are endeavouring to overcome the competition of Holland.

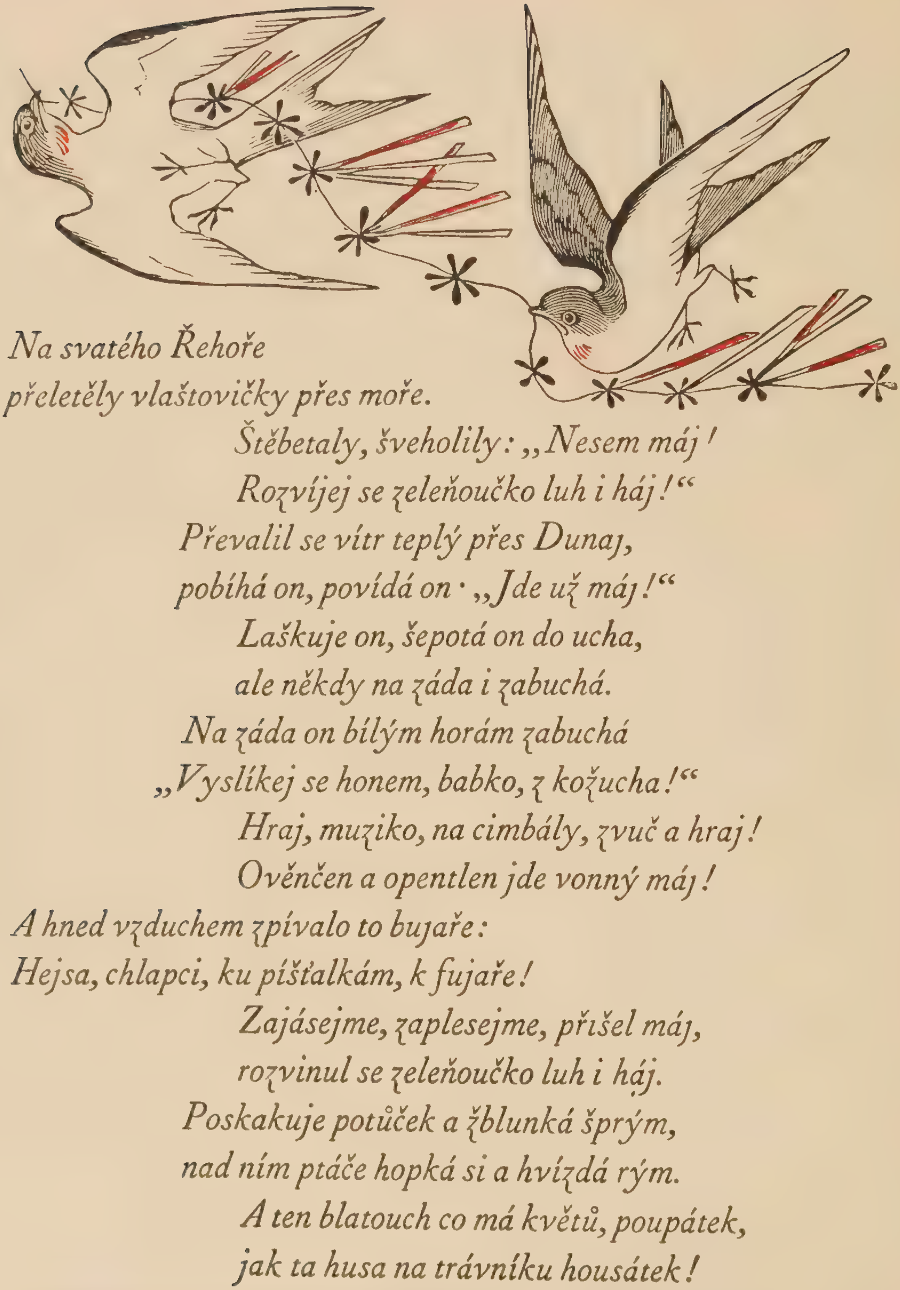
The Musée du Livre, of which M. Henri Liebrecht, a talented writer and an expert in printing, is the general secretary, was founded in 1906, and constitutes a common meeting-place for technicists and lovers of books. Among its publications are a monthly bulletin and collections of specimens of book-printing in all the various processes. The preparation is also undertaken of important volumes, such as "L'Histoire du Livre et de l'Imprimerie en Belgique," in which each period is treated by a specialist.

It can be said that the War exercised a considerable influence on printing in Belgium. It stimulated initiative and widened an horizon which, before 1914, was rather narrow. J. De G.

◆

During the last ten years the graphic industry of the Czechoslovak Republic has passed through remarkable stages of development. The disintegration of Austria-Hungary and the creation of an independent Czechoslovak State on October 28, 1918, was a tremendous stimulant for future work. Prior to the War, Bohemia, Moravia, Silesia, and Slovakia were appanages of the Austro-Hungarian Monarchy, and even industrial tendencies were oriented towards Vienna or Budapest, and in some instances even towards Berlin. It is a noteworthy fact that, despite these handicaps, and despite the fact that the Czechs were bound by economic ties to these three centres, and were, to a large extent, dependent on them for supplies of type, machines, and inks, the Czech national spirit strove after what was best in the new developments in the art of printing—a fact which won recognition at the Leipzig Exhibition of 1914. The Czechoslovak renaissance did not originate either in Austria or Germany, for as early as 1890 the Czechs drew inspiration from the Pre-Raphaelite movement and from the stimulating works of William Morris. A part of the *intelligentsia*, led by Arnošt Prochézek, through the *Modern Review*, endeavoured to instil French ideas and developments. Zdenka Brauner, for instance, applied the charm of Morris's methods to Mrštik's *May Tale* (1897), not only in his composition, but also in his bookbinding.

The governing principle of book-printing in the pre-War era was perfect composition and faultless printing. The leading spirits of the movement were Vojtech Preissig, graphic artist, and K. Dyrynk, typographist, who collaborated in complete accord. Preissig, after visiting Paris, founded the first Czech press at Prague, and worked in etchings, woodcuts, lithography, and colour engraving. In securing type for his press he turned to England and America for type fitted with the diacritic signs proper to the Czech alphabet. Dyrynk's typographical efforts so worthily seconded those of Preissig that the issue of the first edition by "Typografia" in June, 1908, of an example (35mm. × 43mm.) of artistic printing met with such instant success that in September of the same year a second edition was launched in a format of 35mm. × 50mm. Dyrynk spared no efforts to spread new ideas and



Na svatého Řehoře
přeletěly vlaštovičky přes moře.
Štěbetaly, šveholily: „Nesem máj!
Rozvíjej se zeleňoučko luh i háj!“
Převalil se vítr teplý přes Dunaj,
pobíhá on, povídá on · „Jde už máj!“
Laškuje on, šepotá on do ucha,
ale někdy na záda i zabuchá.
Na záda on bílým horám zabuchá
„Vyslíkej se honem, babko, z kožucha!“
Hraj, muziko, na cimbály, zvuč a hraj!
Ověnčen a opentlen jde vonný máj!
A hned vzduchem zpívalo to bujaře:
Hejsa, chlapci, ku píšťalkám, k fujaře!
Zajásejme, zaplesejme, přišel máj,
rozvinul se zeleňoučko luh i háj.
Poskakuje potůček a žblunká šprým,
nad ním ptáče hopká si a hvízdá rým.
A ten blatouch co má květů, poupátek,
jak ta husa na trávníku housátek!

Text page from Táborský's "Veliky Snem Ptaci," decorated by K. Svolinsky, printed by the Prumyslová Tiskárna (Prague, 1928).

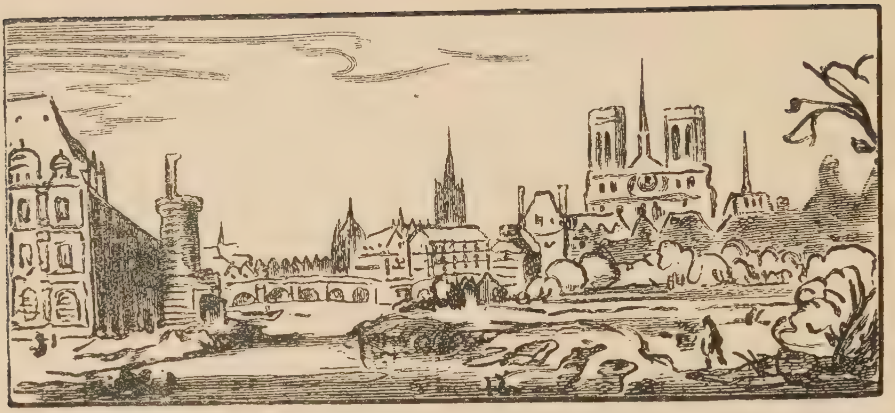
remained an editor at "Typografia" from its foundation in 1889 until the formation of the new State.

Other printing concerns made their appearance, among them the Society of Czech Bibliophiles (founded in 1908), where Fr. Táborský, as chairman, and A. Macek worked in conjunction with MM. Preissig and Dyrynk in the production of artistic books. Other corporations, imbued with similar ideas, were founded, and up to the outbreak of the War Czech typography enjoyed continuous development.

With independence came a vast renewal of effort in all directions. In the typographical world great strides were made. New printing presses were founded and existing concerns were modernized and reorganized. Dyrynk was chosen as technical director of the State Printing Department, and proceeded to revolutionize the whole establishment. His first demand was for perfect work, both in machine and hand setting. New equipment and modern methods, which he introduced, soon brought the Department into the first rank. In 1922 the Industrial Press was founded, with M. Kálab as technical chief; the equipment included Monotype machines from England, French classic type, and English and American printing machines. The result of these efforts was that Czechoslovakia was enabled to compete with distinction at the Paris Exhibition of 1925, and again at Leipzig in 1927.

During the last decade further new undertakings were launched, including the Politika, Unie, Grafie, Orbis, and Melantrich companies. According to statistics there were 7,122 book printers in the Czechoslovak Republic in 1922 and 8,230 in 1927.

From these figures it will be seen that the industry is in a healthy state. Czechoslovak book printers follow with keen interest the progress in neighbouring Germany, the efforts put forth in Holland and in France, and the wealth of activity shown in England, and endeavour to emulate the technical excellence displayed there. R. H.



LETTRE I

Vous n'avez jamais voulu lire d'autres voyages que ceux des Chevaliers de la Table Ronde, mais le noſtre merite bien que vous le liſiez. Il ſ'y rencontrera pourtant des matieres peu convenables a voſtre gouſt; c'eſt a moy de les aſſaiſonner ſi je puis en telle ſorte qu'elles vous plaiſent; & c'eſt a vous de loüer en cela mon intention quand elle ne ſeroit pas ſuivie du succes. Il pourra meſme arriver, ſi vous gouſtez ce recit, que vous en gouſterez apres de plus ſerieux. Vous ne jöüez, ny ne travaillez, ny ne vous ſouciez du menage, & hors le temps que vos bonnes amies vous donnent par charité, il n'y a que les romans qui vous divertiſſent.

Text page from "Lettres de Jean de la Fontaine," with wood engraving by J. L. Perrichon, printed at the Imprimerie Nationale for Helleu et Sergent (Paris, 1920).

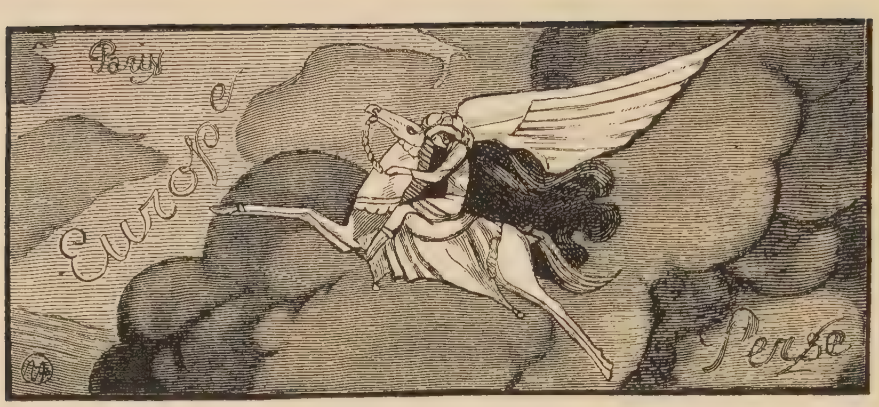
CHAPTER II

FRANCE

The following remarks cannot possibly exhaust the subject of printing in France for the past ten years. Yet, being the result of personal experience in the various fields of art engraving, publishing, and typography, they may be of some use towards helping the reader to form his own conclusions.

During the War, printing in France, as in most countries, made little or no progress, with one notable exception: the steady development of *l'édition de luxe*, a thing so characteristic of French standards and ideals that nowhere anything quite similar is to be found. The origin of the movement, of course, is to be found in the efforts of William Morris and the early English private presses, as interpreted in the pre-War period by Eugène Pelletan, that long misunderstood genius. There had been a traditional output of limited copy editions among the few Sociétés des Bibliophiles; but the interest of the art collector and book-lover at large was not awakened until a new school of illustrators revived the ancient technique of wood-engraving. The bold contrast effects of original wood blocks are now familiar to every one, and have been somewhat cheapened by careless repetition.

They came as a refreshing surprise in their time and gave birth to that widespread public of bibliophiles, or book-collectors, whose continuous demand for novelty remains to this day a peculiar feature of this country, and a seemingly permanent one, at least for many years to come. The pessimist's prediction that over-production would become fatal to the art publisher's craft has come true only so far as a revision of values has taken place, after the great craze of 1919-23; but the tide has not gone back. The presses of such artists as Schmied and Beltrand are producing each year elaborate masterpieces of colour printing; on the other hand, Léon Pichon still holds fast to his impressive and dignified standard of black-and-white typographical masterpieces. Daragnès, Jonquières, Mornay, Sauvage, Le Livre, Helleu and Sergent



LETTRE I

USBEK à son ami RUSTAN

A ISPAHAN

NOUS n'avons ſéjourné qu'un jour à Com : lorſque nous eûmes fait nos dévotions ſur le tombeau de la Vierge, qui a mis au monde douze Prophetes, nous nous remîmes en chemin ; & hier vint-cinquiéme jour de notre depart d'Iſpahan, nous arrivâmes à Tauris.

Rica & moi ſommes peut-être les premiers parmi les Perſans, que l'envie de ſçavoir ait fait ſortir de leur Pays ; & qui ayent renoncé aux douceurs d'une vie tranquille, pour aller chercher laborieuſement la Sageſſe.

Nous ſommes nés dans un Royaume floriſſant ; mais nous n'avons pas cru que ſes bornes fuſſent celles de nos connoiſſances ; & que la lumiere Orientale dût ſeule nous éclairer.

Mande-moi ce que l'on dit de notre Voyage ; ne me flatte point ; je ne compte pas ſur un grand nombre d'Approbateurs : adreſſe ta Lettre à Erzeron, où je ſéjournerai quelque tems.

Montesquieu's "Lettres Persanes" (Paris, Terquem, 1926), with a head-piece and initial by Charles Martin.

have their loyal following of bibliophiles, though wood has been largely supplemented by other mediums, such as etching and lithography. It is to be noted, to be complete, that the success of *éditions d'art* ran parallel with the spread of that speculative and to my mind utterly contemptible craze, the collection of first editions of modern works.

Another typical feature of the last decade has been the remarkable progress, after the War, of printing for publicity. Advertising, here, was long to come into its own; it has already achieved extremely distinctive results, the most noteworthy from our present point of view being the extension of colour printing. A firm like Draeger, where taste is backed by highly organized technique, may be said to have attained to a degree of unsurpassable perfection in typographical printing. This progress is due more to intelligent handling of known processes than to the discovery or improvement of new processes.

The third fact about French printing has only been in the public's eye during the last few years. It is the increasing realization of the importance of typographical standards as such; more and more attention is given to type and to new devices of composition. The lay-out man was practically unknown until quite recently; type was considered as sufficient provided it could be read; wild and atrocious *fantaisies* went by uncensored. The combined influence of two separate movements, coming from two opposite points of the compass—art printing on the one hand, high-grade commercial printing on the other—have brought about what bids fair to be a revolutionary change in our standards. The first sign of this change, I may be allowed to point out, was the alteration of ordinary book covers, whose average typographical dullness was swiftly changed into a variety of loud and effective appeals to the attention of the passer-by.

The hint has been so widely taken up that a new profession, that of typographical expert, is even now coming into existence. This new interest in the arrangement of type would of course come to nothing without the steady efforts of French typefounders (at least of Deberny and Peignot) to produce type faces suited to the needs of to-day—sometimes to the needs of to-morrow.

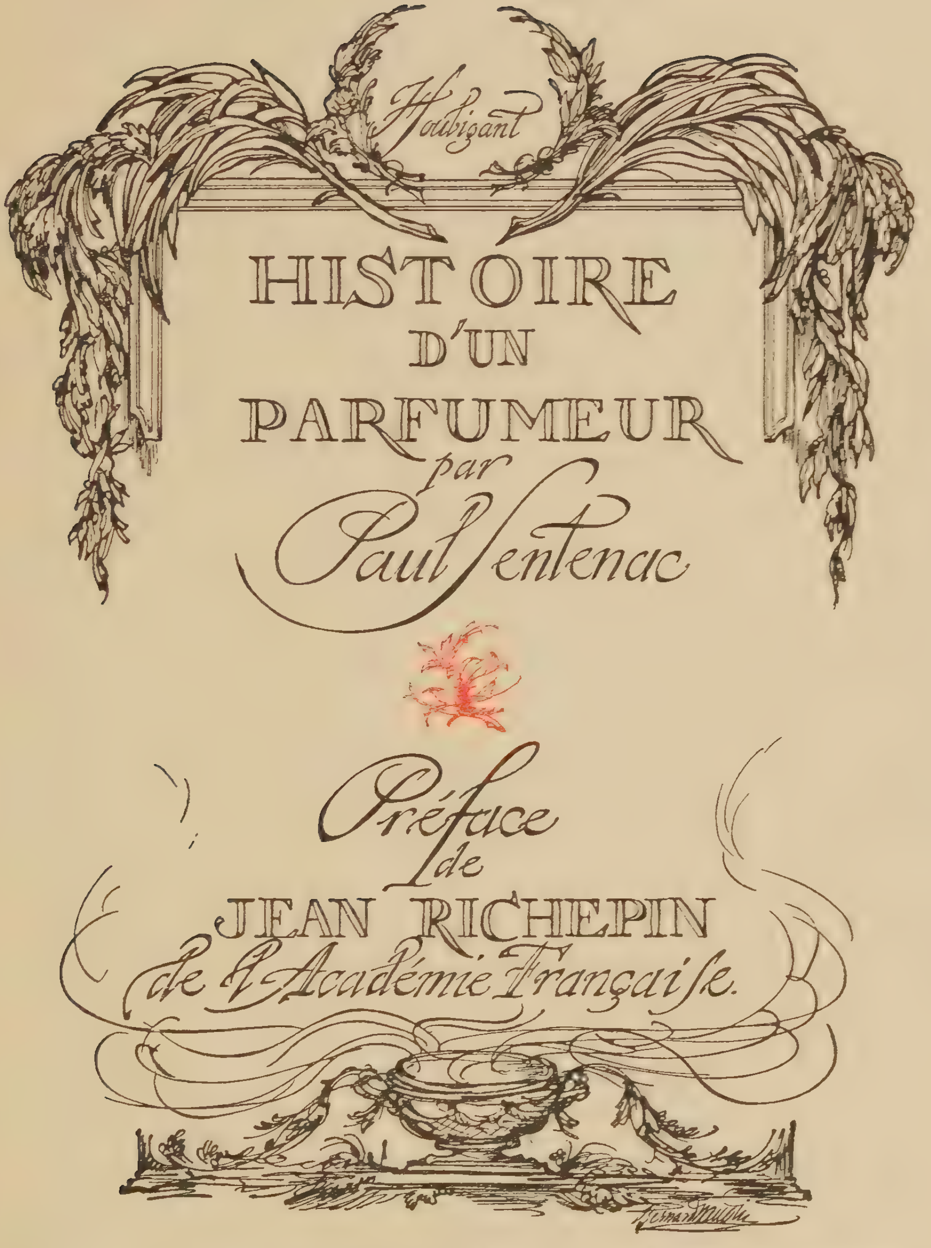
Printing is now being recognized as a decorative art. An elaborate and highly interesting magazine, *Arts et Métiers Graphiques*, is devoted to its interests. Other reviews give it a special place with films and disks, as a supremely modern form of expression. The first Service Typographique has been established in Paris. Printing is *à la mode*.

This, of course, applies mostly to Paris and to organizations of national importance. The average printer, as everywhere, is too bound up with professional routine to respond quickly and willingly to a call for more effort and more intellectual exercise. The small job-printers' standards are simply nowhere. Only by their customers' pressing demands will they be brought to mend their ways.

I have dealt lightly with processes and technical developments because, generally speaking, little has been done in France to outstrip other countries in that line. Some experiments are now going on that may alter this position in the near future, but it is too early to do more than mention them. Amateur prophets will do well, for instance, to bear in mind the name of G. Chardon.

Up to now the characteristic excellence of French printing is to be found in a well-balanced combination of original taste, technical skill, and *conscience professionnelle*, together with a growing realization of modern conditions. What is more, it is developing a strong and very conscious personality in style. Altogether a hopeful position.

M. V.

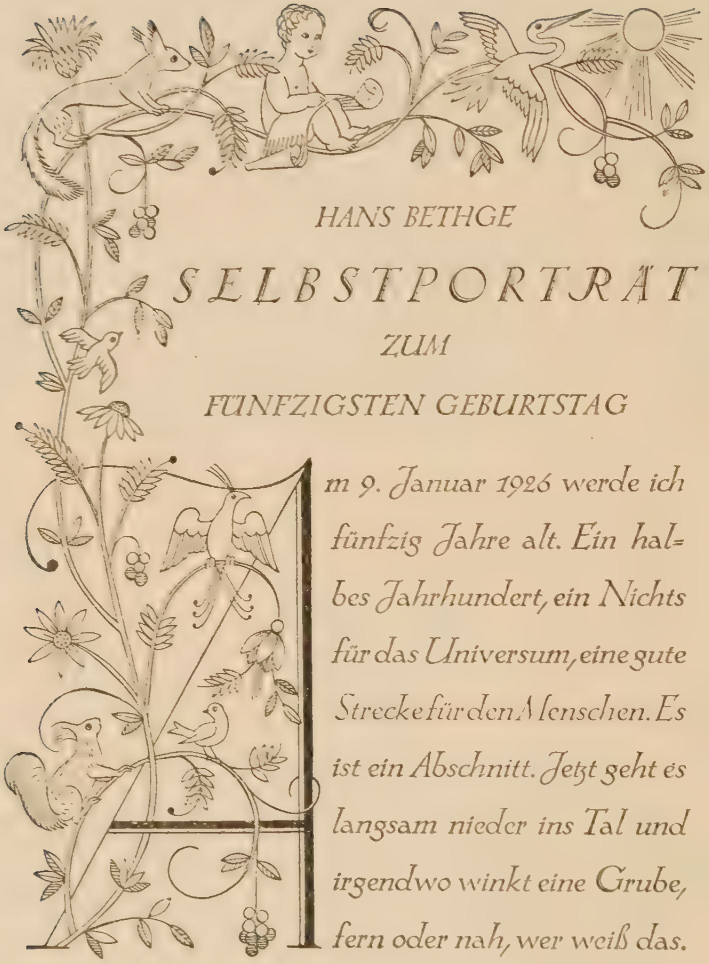


Houbigant

HISTOIRE
D'UN
PARFUMEUR
par
Paul Sentenac

Préface
de
JEAN RICHEPIN
de l'Académie Française.

From the Jubilee volume printed by Draeger Frères for Messrs. Houbigant.
The illustrations are by Bernard Naudin (Paris, 1928).



HANS BETHGE

SELBSTPORTRÄT

ZUM

FÜNFZIGSTEN GEBURTSTAG

Am 9. Januar 1926 werde ich fünfzig Jahre alt. Ein halbes Jahrhundert, ein Nichts für das Universum, eine gute Strecke für den Menschen. Es ist ein Abschnitt. Jetzt geht es langsam nieder ins Tal und irgendwo winkt eine Grube, fern oder nah, wer weiß das.

Hans Bethge's "Selbstporträt" (Offenbach a/M., 1926), with a border by Willi Harwerth.

CHAPTER III

GERMANY

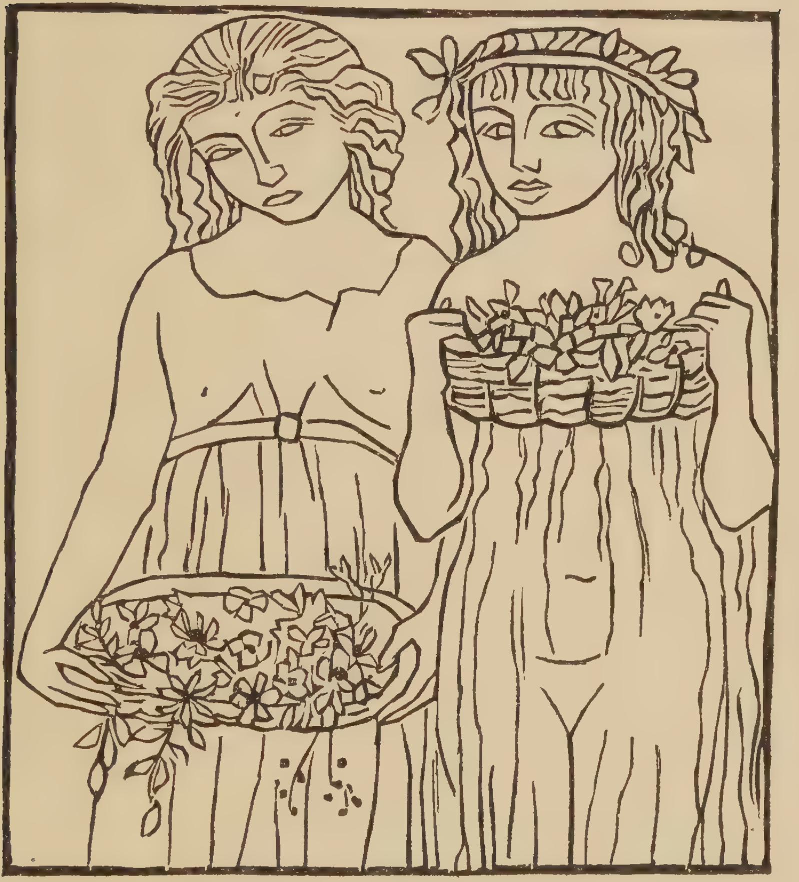
The International Exhibition of Book-printing and Illustration, held in Leipzig in 1914, showed the German book trade at the summit of its development. Then came the War and with it an unprecedented decline. The whole craft came to a temporary standstill. Unemployment became general in the book-printing trade, and was succeeded by a marked lack of skilled workers. It became necessary to employ women at letter-case and composing machine. There was a shortage of the most necessary raw materials; questionable substitutes gave rise to the term "war goods." Paper and colour were incredibly inferior in quality. The metal of the typefounders was confiscated; printers had to sacrifice part of their type and plates; many of the smaller works had to close. After the War recovery was slow. In 1918 the Committee of Standards for the Printing Trade was formed, whose aim was to standardize and thus cheapen paper, materials, tools, and machines. After the inflation, trade was good, but to-day it has again declined, and distress is great in every branch of the industry. On all sides great efforts are being made to effect economies and thus to increase returns. Scientific knowledge and improvements, together with the will to produce goods of high quality, have gradually restored the high level of printing, as is convincingly shown at the annual fairs and exhibitions in Leipzig.

Type and make-up have undergone considerable changes since 1912. Until the War the aim was to produce effects by arrangement of masses, beauty of type, and harmony between paper, colour, and print. Unfortunately, the War and Russian influences have undermined the principles generally recognized until then. Expressionism and Dadaism exploded the tradition of straightforward composition. The page was decorated with expressionist dots, lines, stars, &c., sprinkled anyhow; words were spaced for emphasis until they became illegible, and the "fluid" form of make-up became the fashion. There was a return to the typographical principles of a century ago—types were chosen sloping at daring angles, roman and gothic types were mixed, and calligraphical flourishes and engraved and ornamental types were introduced.

But gradually taste again became purer. The old time-tested characters of Didot, Walbaum, Garamond, Baskerville, Breitkopf, Unger, and others became popular once more. The movement towards a "New Simplicity," so marked in architecture, affected book printing also, and gave the printed page a different appearance. This new typography endeavours to be an expression of the spirit of our time—the up-to-date printed work must possess the qualities of clearness and practical simplicity of outline. The slogans are "Utility as an art principle in an age of technical science and machinery," "Engineering principles as applied in art," and so on. All historical tradition, all ornament, all those splendid artistic scripts on which the fame and beauty of German printing so largely depend, are eliminated. Plain black letters are preferred, as these are supposed to be "unhistorical, constructive" characters, and there is a marked tendency to emphasize line make-up and symmetrical rhythms by variations of line and mass. This, of course, gives unlimited possibilities of make-up, but the exaggerated preference for this style of type is a distinct weakness. Its expressive value is low and its plain, practical simplicity cannot replace the different emotional qualities of roman, gothic, or schwabacher type. Some of the works thus produced are undoubtedly individual in style, but many are quite barren. Apart from such extremely modern products, a great deal is being done in artistic posters and prospectuses and in packing and propaganda material, and we owe innumerable new types to the cooperation of prominent artists. The professional illustrator, not the printer, fixes for the most part the level of German high-class printing.

Whereas on the one hand engineers and scientists make use of roman type in their publications, in the interests of foreigners, on the other hand there is a strong tendency towards giving more prevalence to the German script. This effort is being furthered by the Bund für deutsche Schrift (League for German Script), which has the support of various official bodies, for instance, that of the Reichs Minister of Posts. Several newspapers, among which is the *Kölnische Volkszeitung*, which previously used roman type, have reverted to the use of Fraktur, while a few others, of which the *Berliner Tageblatt* and the *Börsen Courier* are examples, are now using roman type instead of Fraktur.

mollia luteola pingit vaccinia calta.
ipse ego cana legam tenera lanugine mala
castaneasque nuces, mea quas Amaryllis amabat;



addam cerea pruna, honos erit huic quoque pomo;
et vos o lauri carpam et te proxuma myrte,
sic positae quoniam suavis miscetis odores.
rusticus es Corydon: nec munera curat Alexis,
nec, si muneribus certes, concedat Iollas.

Text page from the "Vergil" of the Cranach Press (Weimar, 1926), with a wood-engraving by Aristide Maillol.

Paper money in most countries is printed in gothic, which is also often preferred for newspaper headings. *The Times*, *Detroiter Abendpost*, *Il Messaggero*, and the *New York Times* may be mentioned as examples. Foreigners are only able to read schwabacher and gotisch with difficulty, but above all they prefer to read German literature in roman.

Revolutionary changes have also taken place since 1912 in printing-machine construction. At the Exhibition of 1914 the first "Irismachine" was on view, which did four-colour work at one printing (black, yellow, red, and blue). During the War all development in printing-machine construction came to a standstill. Later, attention was concentrated on designing "fast printers" in order to increase the speed of output, and resulted in the construction of automatic printers, among which the "Elka-Vollautomat" and the "Vertical Miehle," both upright cylinder fast presses, the Heidelberger automatic printer, and the Coswig platen press, all fitted with an excellent feeding system, must be noted. Of special interest is an offset platen press. The large cylinder fast press "Munda," manufactured by L. Mundschenk in Uelzen, so far but little known, is built on quite new lines and ought to have a future. Fast presses have been classified according to size in five groups. To counteract the disadvantages of the great variety in forms of fast presses, a standard fast press is being designed. Cylinder washing machines and slip-in machines are steadily becoming more popular.

In connexion with the new mechanical finishing and dressing processes, mention must be made of Lange and Schwaerzler's "Marzio" process and the Duennhaupt polishing and spraying process, as well as of the well-tried chalk process. Coloured printing can scarcely be improved. Some firms are building polychrome rotary machines, the high quality of which is recognized abroad.

In the newspaper printing trade considerable use is nowadays being made for daily papers of rotary machines in series to prevent excessive vibration of the ink supply. The largest rotary machine of this type, built by the M.A.N. Company, at the moment the largest in Germany,* consists of 15 units, is 42m. long, 5m. broad, 4.5m. high, covers an area of 210 sq. m., and weighs 240,000kg. The *Dortmund Generalanzeiger* is printed on this monster. Its paper consumption is 21,000kg. an hour at 18,000 revolutions. The machine has a non-lifting ink-distributor device, pipe ink feed, excellent paper-carrying arrangements, and other novelties.

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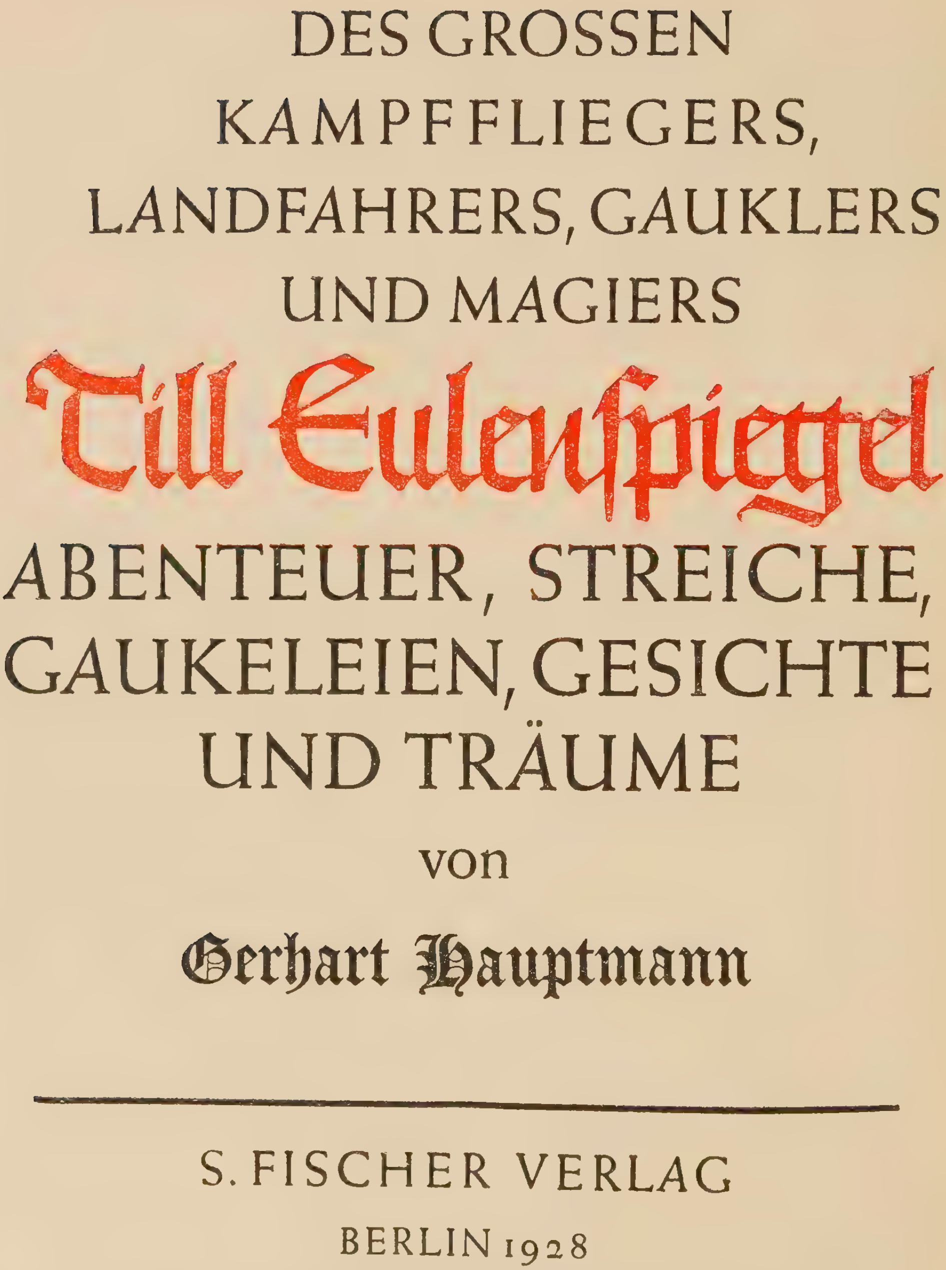
* Two 18-unit presses of the same type were installed in Manchester in 1927 by an English press builder. Since that date several larger machines have been built by other makers.

Newspaper printers are taking full advantage of the latest scientific achievements, such as the wireless transmission of pictures. The last decade has seen an enormous increase in the use of composing machines (Linotype, Typograph, Monotype, Intertype). The Linotype machine is perhaps the most popular, and, like the Intertype, has been improved and its usefulness increased. Both make possible the setting up of advertisements in the most varied types and sizes. The "Ludlow" auxiliary machine casts lines of capitals, borders, spaces, and so on; the "Elrod" casts leads. These machines make the printer almost independent of the typefounder. Matrix presses of enormous power and automatic casting machines turn out plates in large numbers in an astonishingly short time. The Cologne Exhibition of 1928 provided an excellent survey of Germany's highly developed newspaper trade.

The German book has undergone many changes since 1912. During the War it fell from its high level to regrettable depths, as leather, linen, good paper, and ink were practically unobtainable. Substitutes, imitation leather and linen papers, batik and so on, had to be employed. The Government control of paper involved further difficulties, all the more as towards the end of the War paper was being used for cloth, clothes, blouses, handkerchiefs, sacking, string, and many other things. Older editions were prized as "peace goods." After the War the so-called "luxury" book appeared, to satisfy the profiteer's thirst for splendour. Expensive bindings were put on works of very doubtful quality, with etchings, woodcuts, and lithographs as illustrations. Numbered copies, signed by author and illustrator, were in great demand. These pompous volumes, often in expensive cases and with one of the original plates as a guarantee, so to speak, are reminiscent of the "special editions" of the end of the nineteenth century. Private presses shot up like mushrooms, and the "book beautiful" in editions limited to a hundred became the great ambition of all bibliophiles. As books for everyday use, novels and the like, were relatively extremely cheap, the book trade flourished. Since 1924 the general endeavour has been to produce a good, cheap, tastefully got up book. Unfortunately, sport is diverting more and more people from good books, so that propaganda has had to become much more intensive and cooperative book-buying has had to be fostered. "Book Day" is a method of increasing the demand for books. Certain works have had enormous sales; "All Quiet on the Western Front," for instance, has run to over



DES GROSSEN
KAMPFFLIEGERS,
LANDFAHRERS, GAUKLERS
UND MAGIERS
Till Eulenſpiegel
ABENTEUER, STREICHE,
GAUKELEIEN, GESICHTE
UND TRÄUME
von
Gerhart Hauptmann

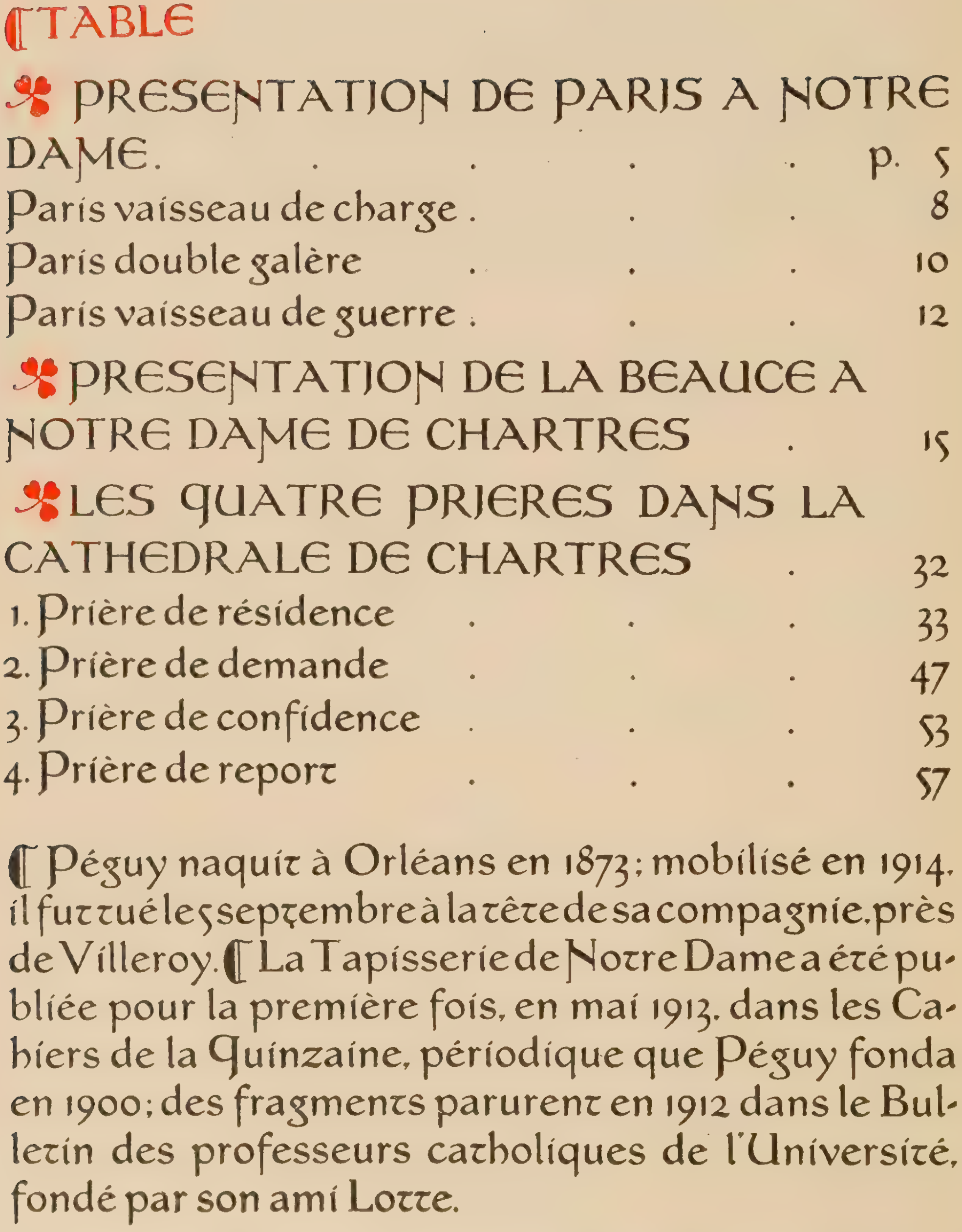
S. FISCHER VERLAG
BERLIN 1928

Title-page from Gerhart Hauptmann's "Till Eulenspiegel," printed by Poeschel und Trepte (Leipzig, 1928) for S. Fischer, Berlin.

half a million. Richly illustrated magazines and periodicals are popular. Generally speaking, the German book to-day reaches a high level in every respect.

After heavy trials, such as the book trade of no other country has had to endure, the German book trade is once more in a very satisfactory position, striving to do honour to the great inventor of printing, Johannes Gutenberg.

R. E.-H.



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¶ Péguy naquit à Orléans en 1873; mobilisé en 1914, il fut tué le 5 septembre à la tête de sa compagnie, près de Villeroy. ¶ La Tapisserie de Notre Dame a été publiée pour la première fois, en mai 1913, dans les Cahiers de la Quinzaine, périodique que Péguy fonda en 1900; des fragments parurent en 1912 dans le Bulletin des professeurs catholiques de l'Université, fondé par son ami Lotte.

Colophon from "Poèmes de Charles Péguy" (La Haye, Kunera-press, 1929).

CHAPTER IV

HOLLAND

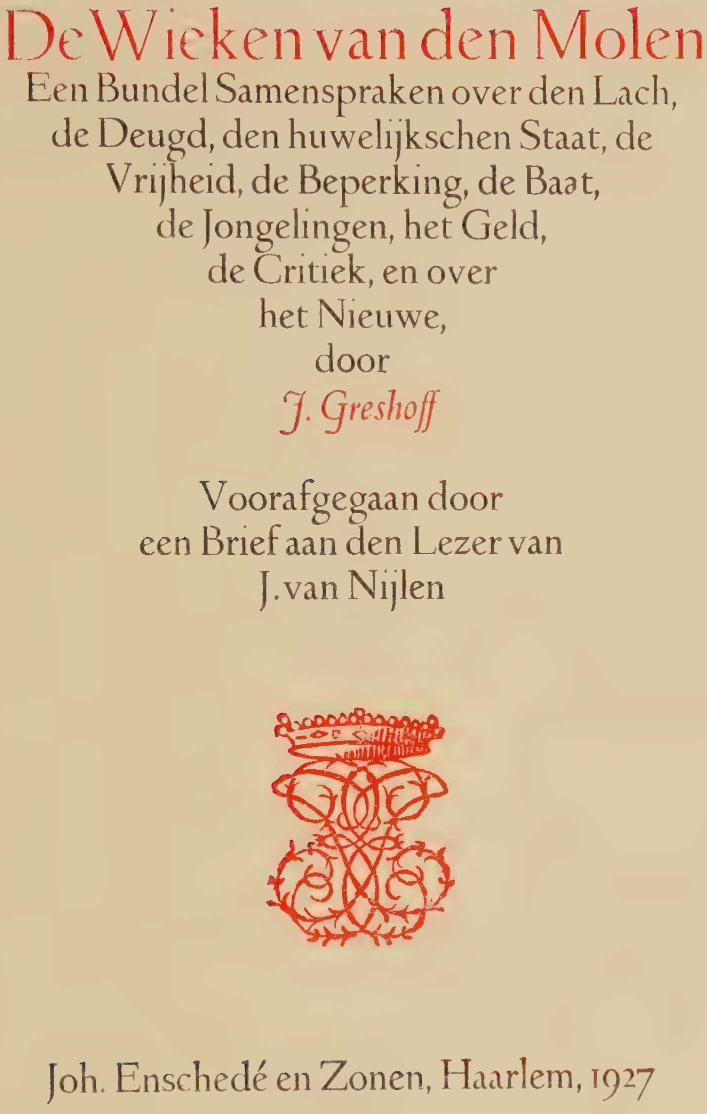
Even if the invention of the art of printing by Coster were a legend, Holland can claim to be the "Cradle of Printing." The art of the book and the graphic arts in the Low Countries had many able disciples, not only in the time of the incunabula and the beginning of the sixteenth century, but also in the seventeenth century, when the art of printing was brought to a high level by the editions of Blaeu and Elzevir. It is true that a decay followed, especially in the nineteenth century, which lacked a style of its own; but a similar fate befell all the applied arts, including the art of the book.

In the late nineties, due to the inspiring example of William Morris, a revival began by which the art of the book was influenced. Great pains were taken to make a book "a thing of beauty." It took some time before people went to the root of the question. At first too much stress was laid on the binding or the decoration of the book. Apart from many fine bookbindings with beautiful fly-leaves, a choice of characteristic woodcut vignettes and initials, and ingenious and unexcelled book decorations and illustrations, some really well "built" books were produced; but the type-choice or the composition was usually the weak point. Some years elapsed before it was realized that the type and the make-up are essentially the first requirements for a good book. At first a few tradesmen, artists, and publishers did their utmost to spread this view, to lead the trade in pure typographical paths and to free it from foreign influences. We have to mention here the historian J. W. Enschedé, the printers B. Modderman (publisher of the *Drukkers Jaarboek*), M. Mouton, G. P. Tierie, the publishers W. L. and J. Brusse, and C. A. J. van Dishoeck; but especially the Amsterdam Typefoundry, who, since 1907, have engaged the writer of this article as artistic collaborator for their large and growing business. The School of Typography in Utrecht, established in 1907, is also noteworthy.

The Amsterdam Typefoundry—after having executed under my supervision some new specimen books of types and ornaments, among which was the new Javanese type done by the writer of these lines—appeared on the market in 1912 with the Hollandsche Mediæval by the same artist. By so doing we fulfilled a long-cherished wish, creating a new type in the modern Dutch spirit, avoiding the "too graceful," though trying, in the first place, to give, not something different, but something better. It was acclaimed warmly and used at once by well-known printers and publishers. There are few printing offices in the Netherlands which do not use it, especially because it can also be made by the Intertype. It placed book-production on a higher level. Many weekly and other periodicals use it. Indeed, it has become too general for special work. For this reason, and because of the interest shown for better books, the Amsterdam Typefoundry came out in 1923 with a lighter, finer type, the Erasmus Mediæval, to which an italic was added. Both were designed by the writer, and they have been appreciated in Holland as well as by experts of other countries, including Stanley Morison, Updike, and Bertieri. In 1925 it was followed by the Grotius, a bold type corresponding to the Erasmus Mediæval. Mention must also be made of the Ella italic, designed by stylograph. The Amsterdam Typefoundry also helped the growing art of advertising to many a type, like the "Grotesque" series—Success, the Bristol, and Carlton type, and a new series, Nobel grotesques, now in preparation.

The other Dutch typefoundry is that of Messrs. Joh. Enschedé en Zonen, of Haarlem, who keep in their collection treasures of old types. In 1925 they placed on the market the Lutetia roman, designed by J. van Krimpen, followed by the corresponding italic. The Lutetia is a graceful open type, the italic narrower in shape, both with a slightly French touch. They were well received and have been used, especially by Messrs. Enschedé themselves, for bibliophile editions, under the care of the designer. Lately some sizes of a Greek type, called Antigone, designed by the same artist, were made by the Haarlem firm. The Houtsnee-letter, a woodcut type, by A. van der Vossen, specially designed for woodcuts and darker illustrations, appeared in 1925.

The example of the bibliophile editions was inspiring. Oldest among them are those known as *De Zilverdistel*, which since 1915 have been printed by Mr. J. F. van Royen on his private press, since 1923 called *Kunera-press*. For this press Pissarro designed the Distel type, inspired by the Caroline minuscule for medieval texts, and the writer of these lines a roman type, the Zilvertype, for modern texts. In the beginning Messrs. Enschedé also printed some editions for the *Zilverdistel*, as they



De Wieken van den Molen
Een Bundel Samenspraken over den Lach,
de Deugd, den huwelijkschen Staat, de
Vrijheid, de Beperking, de Baat,
de Jongelingen, het Geld,
de Critiek, en over
het Nieuwe,
door
J. Greshoff

Voorafgegaan door
een Brief aan den Lezer van
J. van Nijlen

Joh. Enschedé en Zonen, Haarlem, 1927

Title-page from "De Wieken van den Molen," printed by Joh. Enschedé en Zonen, Haarlem, in their Lutetia type, designed by J. van Krimpen.

did with success and still do for German bibliophile publishers. The *Palladium* editions, by J. van Krimpen, as a rule printed with the Caslon, appeared for the first time in 1920. It was in the same year that Ch. Nijpels of Maastricht began to publish a series of fine books, printed under his direction for his own firm, Leiter-Nijpels, or for other firms, like "La Connaissance" of Paris. At short intervals appeared, first in Maastricht, then in Brussels, a series of well done books by A. A. M. Stols. The Society "Joan Blaeu" merits to be mentioned for three fine publications and for the exhibition of Dutch book art organized in 1920. Finally I have to mention the second (my own) "private" press in Holland, the *Heuvelpress* in Hilversum, of which the first edition appeared in 1928, with a new type of my own design, the Meidoorn. The woodcutters D. Essers, J. Franken Pzn, F. Mees, and L. O. Wenckebach created for the publishers skilful illustrations and decorations.

All of the work to which reference has been made is based mainly on the idea of using the sound principles of tradition in a modern spirit. There is another school, in which the decorative part of the book is more emphasized. The architect H. Th. Wijdeveld is here the leading artist. He attains surprising effects with the simplest typographic material. Anton Kurvers is a skilful adept in this rather dangerous trend. In a short article it is unfortunately impossible to mention other prominent persons in the printing trade of Holland.

It is, however, possible to point with satisfaction to the success achieved by Dutch book art at the recent exhibitions of Antwerp, Leipzig, Florence, Cologne, &c. The art of the book in the Netherlands is a subject of vivid interest, if we may judge by everything that is written about it, but we are still waiting for a good monograph.

From a technical point of view also good work is being done in Holland. Many enterprising printers immediately apply new processes. For example, there is the offset printing of the firm L. van Leer and Co., well known in England, and of the firms Teulings and Co. and Senefelder Company. The Rotagravure Company of Leyden has done very good work in intaglio printing and also in colour work. Finally, there are excellent photographers like B. Eilers, process engravers like Dirk Schnabel, the Polygraaf at Haarlem, the Reproduction Company at Rotterdam, and Boelaars Company at The Hague, who make one and multi coloured blocks. The art of advertising counts many able designers and professionals, although it has not yet reached the high level attained in some other countries. The newspaper Press and the periodicals in many cases compare favourably with those abroad. Colour printing in newspapers has been brought to a high degree of excellence in the *Algemeen Handelsblad*, of Amsterdam, in which old Dutch masters and other colour pictures are admirably reproduced. These three-colour illustrations are printed at high speed on rotary machines. The blocks are afterwards used for printing special copies of the illustrations on art paper, of which many thousands are sold to the readers of the newspaper, and the net profits are given to a charity.

S. H. DE R.

CHAPTER V

ITALY

From 1912 until to-day, but above all after the War, Italy has made enormous progress in the printer's art. Although new processes have not been invented in Italy, nor new machinery produced, all the most notable improvements made abroad have been introduced, and the plants have been brought up to date. At present a big development is going on in rotagravure processes, especially as applied to illustrated weeklies. In many branches of the printing industry Italy is gradually becoming independent of foreign supplies.

In the printing of books and artistic reviews, first among the firms which distinguish themselves for the excellence of some of their publications is the Istituto Italiano di Arti Grafiche. Worthy of note is their sumptuous volume of the Vatican Gallery, with reproductions in calcography and heliotypy; Dante's "Vita Nuova," reproduced photolithographically and printed with offset machines; the volume "Rome" of the painter Mentessi, &c. The Mondadori firm's "Omnia" edition of the complete works of d'Annunzio with Bodoni type cast from the original punches is a magnificent production. This firm is using for an edition of Italian classics an entirely new type design by the poet Francesco Pastonchi, which has been cut for Mondadori by the Monotype Company.

The Istituto De Agostini, of Novara, has achieved success with its geographical productions, and recently with a series of volumes (translated and published also in England) on the "Cities of Italy," a work which has been much appreciated. It is printed in rotagravure, and supplemented by artistic water-colours. The firm of Hoepli is renowned for its output of technical books; and among their artistic editions figure a splendid volume, "Tre secoli di storia milanese" ("Three Centuries of Milanese History"), and the illustrated works on Milanese history of Malaguzzi Valeri and Mario Borsa. The firm of Bestetti and Tuminelli has produced, among many other beautiful publications, the volumes on the "Arte bizantina in Italia," the "Giardini d'Italia," and the "Architettura arabo-normanna in Sicilia." Among other firms worthy of mention are the Unione Tipografica Editrice Torinese, and the firms of Treves, Sonzogno, and Vallardi.

The Ricordi firm was the first to buy offset machines; and, in addition to printing its usual musical works, was responsible for the printing of the magnificent Atlas of the Italian Touring Club, which—from the typographical point of view also—is one of the most beautiful productions that have appeared in Italy in recent years. The Rizzoli firm has created a big industry for rotagravure printing, with plants at Milan and Rome, and is now printing the "Enciclopedia Trecani," of which the first volume has recently been published, a work perfect in all respects. The Alfieri and Lacroix Company was one of the first printing houses to work blocks in black half-tone and in three colours, and owns a splendid installation of offset machines. The Alinari Company of Florence, the Cellograf Company, the Bertarelli Printing Company, the firms of Berardi and of Turati Lombardi, and the Cohen Printing Company must also be mentioned.

Various plants exist for printing on tin in a variety of colours, such as the Metalgraf of Milan, De Andreis of Sampierdarena, &c.

The bookbinding industry has lagged somewhat behind, but to-day it is regaining lost ground. The machinery used in the industry is supplied by America and Germany.

A notable development has taken place in the printing ink industry. Only two small factories existed fifty years ago. Immediately after the War various printing ink factories were opened, financed by Italian capital, and it may be said with certainty that the production of those existing to-day is more than sufficient to supply the needs of the printing industry of the country. Unfortunately some Italian printers still have a special preference for foreign, and especially German, products; a preference which is unjustified, because the manufacture of printing ink has now reached a high pitch of perfection in Italy. While before the War the dry colours necessary for the manufacture of printing ink had to be imported, for the most part from Germany, they are to-day to a great extent manufactured in Italy. There are other products for the supply of which the Italian printing ink factories have become independent of foreign sources. Among these products are the gelatine for the manufacture of the roller composition; soot (in part), glycerine, linseed oil, and heavy and boiled oils.

Milan, the printing centre, has for many years had a modest professional school for those who wish to enter the printing industry.

The school was recently considerably enlarged and furnished with modern machinery. Other similar professional schools exist at Genoa, Bologna, and Turin.

This rapid review would be incomplete without a reference to the Stabilimento Poligrafico, which has arisen at Rome on the initiative of the Fascist Government, and which, perhaps, is an institution unique of its kind. It prints everything that is required by the various State Administrations, the volumes of statistics, the State bonds, &c. It covers more than 15,000 square metres, and employs about 1,200 hands. It is equipped with twenty-four Linotype machines, twenty-two Monotype casters and keyboards, seventy printing machines fitted with automatic feeders, seven lithographic offset machines, a large machine for rotagravure printing, a stereotype and block-making plant, and thirty bookbinding machines. G. S.

LE POESIE
DI
UGO FOSCOLO
VOLUME UNICO

Con la Vita, un Indice delle cose Notevoli
e una Bibliografia a cura di
A. Mocchino

LA RACCOLTA NUOVA
DEI CLASSICI ITALIANI
MONDADORI · MILANO
1927

Title-page from a volume in the new series of Italian Classics printed by Messrs. Mondadori in a new type designed by Francesco Pastonchi.

CHAPTER VI

POLAND AND SPAIN

The mechanical equipment of Polish printing presses was hardly ever equal to that of the important houses of Germany and Western Europe, but the ambition and skill of individual printers produced work of a very high level. Before the War Cracow was the centre for fine printing, and both Cracow and Lwów printed books for Warsaw publishers which the Russian censorship would not allow to be printed in Warsaw. Good printing plants existed in Poznania, Pomerania, and Upper Silesia, but they produced no very remarkable work.

Both technical progress and the care of craftsmanship—revived in Poland about 1900—came to a standstill during the War. At present financial difficulties prevent a thorough modernizing of equipment, despite a great increase in publishing activities. A Warsaw and a Cracow newspaper form notable exceptions, being provided with thoroughly up-to-date machinery. They have started three-colour illustrations on rotary machines and obtain appreciable results on mediocre paper. In general Polish newspaper printing suffers from cheap paper and bad inks, which have to be taken into account by advertisement designers, since they render delicate type-faces and half-tone blocks quite ineffective.

Collotype illustrations are printed abroad—mostly in Vienna. Two Warsaw firms carry out exceedingly fine colour work, the enthusiasm of their owners surmounting the difficulties of inadequate equipment. Monochrome book illustration is mostly carried out by zinc half-tone blocks printed on art paper, which has become undeservedly popular as the mark of a good edition. There are several rotagravure plants, the best results being attained at Cracow. Colour work has also been attempted there with a measure of success, but large colour jobs in rotagravure are carried out abroad. Offset presses are plentiful, but colour work is often impeded by the lack of skilled workmen.

Types and matrices are mainly imported from Germany, and rarely have any great distinction. Two French "Cochin" faces, though more suitable for display work, and tiring to the eye in long texts, are much used in Warsaw for lack of other relief from the staleness of uninspired German types. A Baskerville face has also been introduced lately and used for setting some of the more ambitious publications of the Poznan Exhibition, such as the catalogues of the "Palace of Arts" and of the historical exhibitions of the Ministries of Finance and Foreign Affairs. The peculiarities of the Polish language, however, have deprived it of much of its restful lucidity. These peculiarities—a large number of accented letters and the frequent occurrence of y's and z's—are the stumbling-block in the way of Polish type-designers, none of whom has yet found a solution satisfactory enough to be engraved and cast.

The best of Polish printing is done in bookwork and such periodicals as the *Grafika Polska*, *Sztuki Piekne*, and *Silva Rerum*. The revival of careful printing in Poland was part of the general movement in Europe, but it was free from the influence of the Kelmscott Press, receiving its great impetus from Wyspianski, who supervised the printing of his literary works, giving them a severely logical style which gave no hint of his powerful work as a painter and designer of glass windows. The same cannot be said of the artists who followed him in his interest for book production. Even their black-and-white ornamentation shows the painter's hand very clearly. Nevertheless they produced some interesting work, and the peasant art which became a source of decorative inspiration about the beginning of the present century infused their efforts with some of its own strength and charm. The only piece of original Polish typefounding, an ornament designed some years ago and widely used, still shows a faint reminiscence of this source.

Since 1920 printers, publishers, and artists have contributed to produce some excellent work, but most publishers and not a few printers pay scant attention to the bulk of their work, reserving their typographical ambition for objects that excite their special interest. It is true that when this interest is aroused the results are often masterpieces, no pains being spared to produce the desired effects. The collection of Napoleonic manuscripts discovered in the library of Kórnik and recently issued by a Warsaw publisher is a conspicuously fine piece of work.

Colour is the dominant note of Polish art, and even the most restrained examples of book-production have a touch of colour, most often red, on the cover. Nearly all books are published as paper-backs, and in the best work these covers are frequently found to be strictly typographical. Special editions are generally illustrated by well-known artists, wood-engravers, draughtsmen, and decorative designers.

W. J. G.

◆

Few Spanish printing houses when the War was over possessed machinery which was not so old and worn out as to be almost useless; but after the Armistice, and a phase of adjustment in prices and wages, came a period of great activity, when even the smallest works were forced to modernize their methods and equipment. To-day the plant without composing machines is as rare as was the one with them prior to 1914.

Simultaneously with the modernization of already established plants, others were set up the scope of which had hitherto been undreamed of. Among these latter is the publishing firm of Calpe, which for a long time was considered as the most up-to-date in Southern Europe. The Rivadeneyra plant, one of the oldest in Spain, is an instance of notable expansion. This firm was so antiquated that its machinery ought to have been in a museum of the printing trade, but under new proprietorship it has become the most varied and complete installation in Spain for the printing of books and magazines. There have also been mergers of printing works and lithographic shops, and typical of these is Gráficas Reunidas, specially noticeable on account of its excellent work.

In Spanish printing shops slug type-composing machines predominate, although in Catalonia type-setting machines have been generalized, mainly due to the fact that Barcelona was the cradle of the book-publishing industry in Spain. There was at first a great number of stop-cylinder presses of German manufacture, but lately there is a decided tendency towards the American two-revolution press, which is generally recognized as the best when the question of price is not of capital importance. Few are equipped with automatic feeders and pile deliveries, which is due mainly to the labour unions' insistence upon the same number of operators to a machine, whether it be equipped with such improvements or not.

Among lithographic plants the offset press is not widely used, as the scanty output of this kind of work does not as yet warrant modernization of lithographic machinery. Rotagravure, on the other hand, is employed for almost everything, from the regular newspaper to the illustrated magazine and pamphlet.

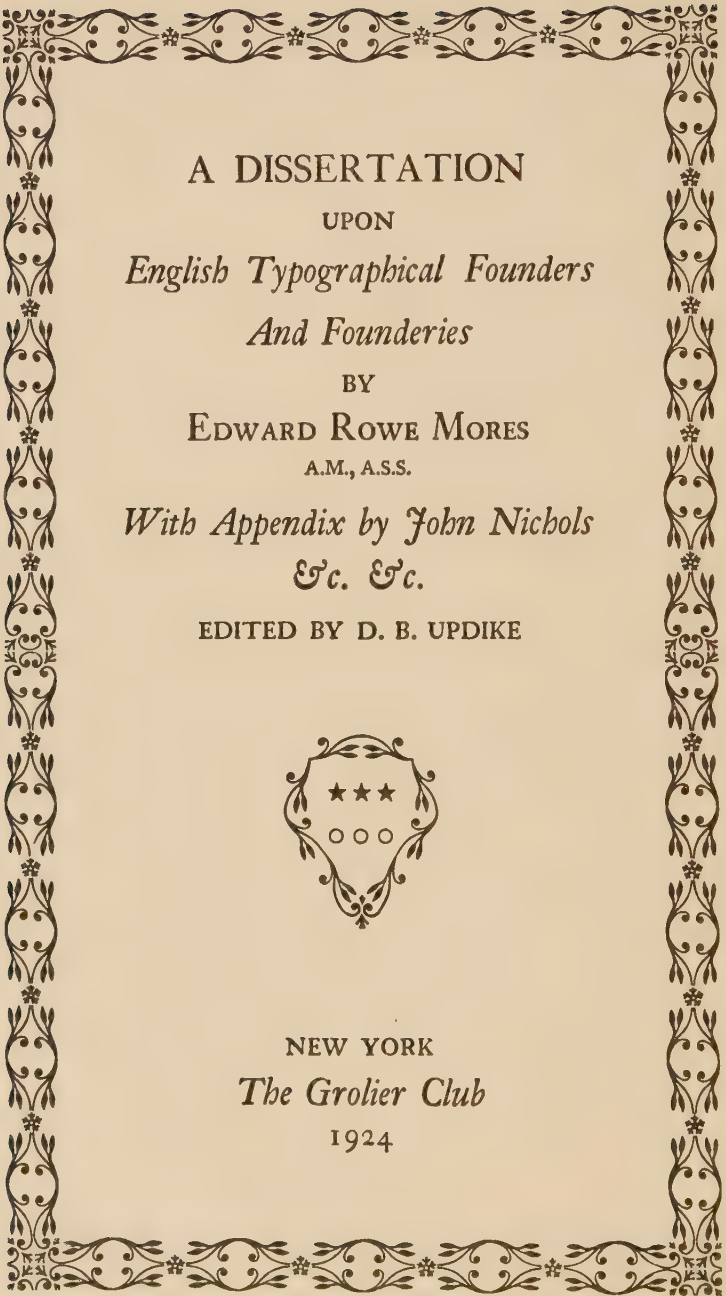
The modernization of printing as a whole is due to a considerable increase in the activities of publishing houses in the country; not only are they enlarging their domestic market and conquering new fields in South America at the expense of French publishers, but they are bringing about a constant increase in the reading public, which prefers their sales methods and fixed prices to those of booksellers.

Practically all books have paper covers, and those bound are, with few exceptions, deficient in technique and taste. The presentation of books in general is, however, very superior to what it was in 1914, and except for special *de luxe* editions, for which there seems at the moment to be no demand, it is also superior to that of other Latin countries. Mention must be made of large *de luxe* editions, such as the Enciclopedia Universal Espasa, which has already published sixty-six bound volumes of 1,500 pages, and has nearly 20,000 subscribers.

The daily Press has undergone a great transformation during the last few years, not only with regard to its political, informative, and industrial outlook, but in its technique. Papers which some years ago were nothing more than party organs to-day offer their readers well-printed pages of interesting matter and the latest information obtained through national and foreign collaboration. *El Sol*, of Madrid, has recently installed new American rotary presses which can print at the rate of 400 revolutions per minute. An increase is notable in stereotype plants for daily newspaper work, preference being given to an original model of plate-caster built in Switzerland, which has a capacity of one plate every seventeen seconds.

Not much progress can be noted in weekly illustrated papers, perhaps because they have not discovered how to turn to advantage printing in colour, which is so much to the Spanish public's taste. Mention must, however, be made of the spectacular success of a new magazine whose only novelty lies in its being entirely produced in rotagravure. The development of rotagravure in colour would certainly offer a bright future for the printing trade in Spain.

J. N. U.



A DISSERTATION
UPON
English Typographical Founders
And Founderies
BY
EDWARD ROWE MORES
A.M., A.S.S.
With Appendix by John Nichols
&c. &c.
EDITED BY D. B. UPDIKE

NEW YORK
The Grolier Club
1924

Title-page from Mr. Updike's edition of Rowe Mores's "Dissertation," printed for the Grolier Club by the Merrymount Press (Boston, Mass, 1924).

CHAPTER VII

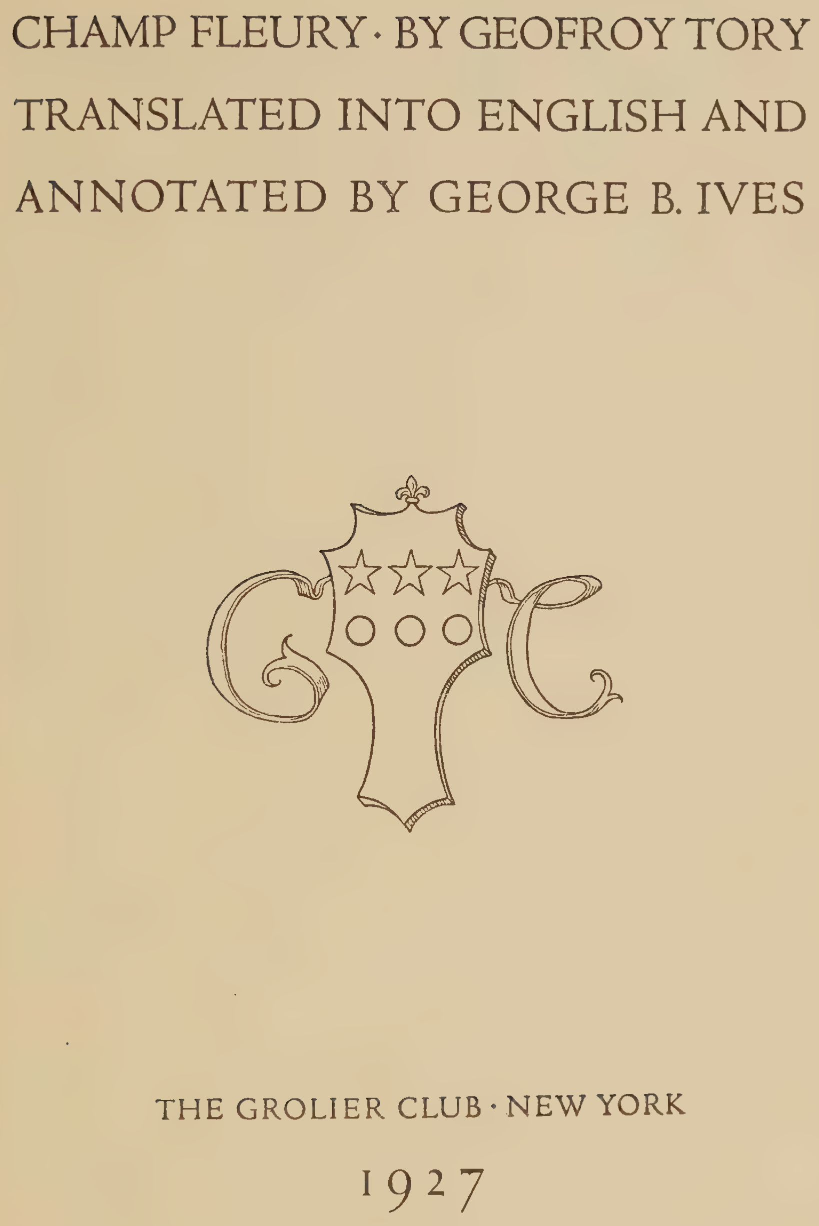
UNITED STATES OF AMERICA

A consideration of the present condition of printing in the United States should by no means overlook the great change which has come over the general American public in its attitude towards good taste and the encouragement which this has given to those who may have been concerned with the graphic arts. Only a short memory is required to bring to mind the generally characterless and over-ornamented typographic and decorative handling of the books and magazines of just a few years ago. Comparing them with the work of to-day, the difference is striking, and, while much of the change has been wrought from within the trade, it is only fair to say that the public was receptive enough to encourage it, and in many instances to request it. This led naturally to a greater interest in good book manufacture on the part of the better book publishers, and that in turn to a demand for more books on good typography and art in printing. In addition to this, the advertising agencies have been of incalculable help in directing and forming a realization and appreciation of good taste in the public mind, for in obtaining the very best typographers and artists, as they have, they have circulated through the newspapers and magazines the choicest specimens of typography and design which the best minds could originate.

Then, in addition to the improved quality of printing in the United States during the past decade or so, the progress of printing has been very largely due to the increased production made possible by improved methods, most of which have been in the direction of speed, as seen in the various automatic presses, automatic feeders, pile deliveries, and devices for eliminating electricity from paper. In the last few years, too, there have been improvements in typesetting machines with the object of producing better type faces. Some of the faces put on the market within the last year, and some of those about to be brought out, are of so distinctive a character that they should be mentioned here. The Linotype Company, through Mr. George W. Jones, of London, has introduced the Granjon types; and this company is about to distribute the Estienne and Merton types, also designed by Mr. Jones, while within a short time it will complete a Baskerville series, taken from the original Baskerville cut by John Baskerville himself, and the Metroblack and Metrolite, the work of Mr. W. A. Dwiggins. The Monotype Company is about to produce the Deepdene type, designed by Mr. Frederic Goudy, America's foremost type-designer, and the Centaur, designed by Mr. Bruce Rogers, the well-known book-designer, as well as the Arrighi, an italic for use with the Centaur, which is the work of Mr. Frederick Warde.

One of the distinctly outstanding specimens of contemporary book printing is the eighteen-volume set of the "Private Papers of James Boswell," which was designed by Bruce Rogers with a view to the presentation of the text in a form harmonious with Boswell's mode of expression. To accomplish this he made use of an English Monotype reproduction of John Baskerville's famous eighteenth-century types. Two other recent books designed by Mr. Rogers call for special mention. One of these is "Ancient Books and Modern Discoveries," by Sir Frederick G. Kenyon, of the British Museum, which was printed for the Caxton Club, the bibliophile organization of Chicago. This book was set in Lutetia type imported from Holland, with headpieces and tailpieces designed by Mr. Rogers, while its collotype plates were printed in England. Another unusual and interesting book handled by Mr. Rogers is Mr. Ives's translation of the "Champ Fleury," by Geofroy Tory, which was set in Centaur type for the Grolier Club, of New York City.

The typographical work of Frederic Warde also calls for mention, for he is striking out on rather distinctive lines, but with a thorough knowledge of the masters of the past. Some of his best work is to be seen in the new edition of Walt Whitman's "Leaves of Grass," in which he has used Estienne type and has followed the format of the first edition (1855), which was set and printed by Walt Whitman himself. There is, too, the delightful three-volume edition of Cooper's "The Spy," set in Granjon and with the collotype illustrations in colour, designed by the same typographer, and the recent "Catalogue of the Engravings Issued by the Society of Iconophiles of the City of New York," set in Granjon and Baskerville faces.



CHAMP FLEURY · BY GEOFROY TORY
TRANSLATED INTO ENGLISH AND
ANNOTATED BY GEORGE B. IVES

THE GROLIER CLUB · NEW YORK

1927

Tory's "Champ Fleury" (New York, Bruce Rogers, at the Press of W. E. Rudge, 1927).

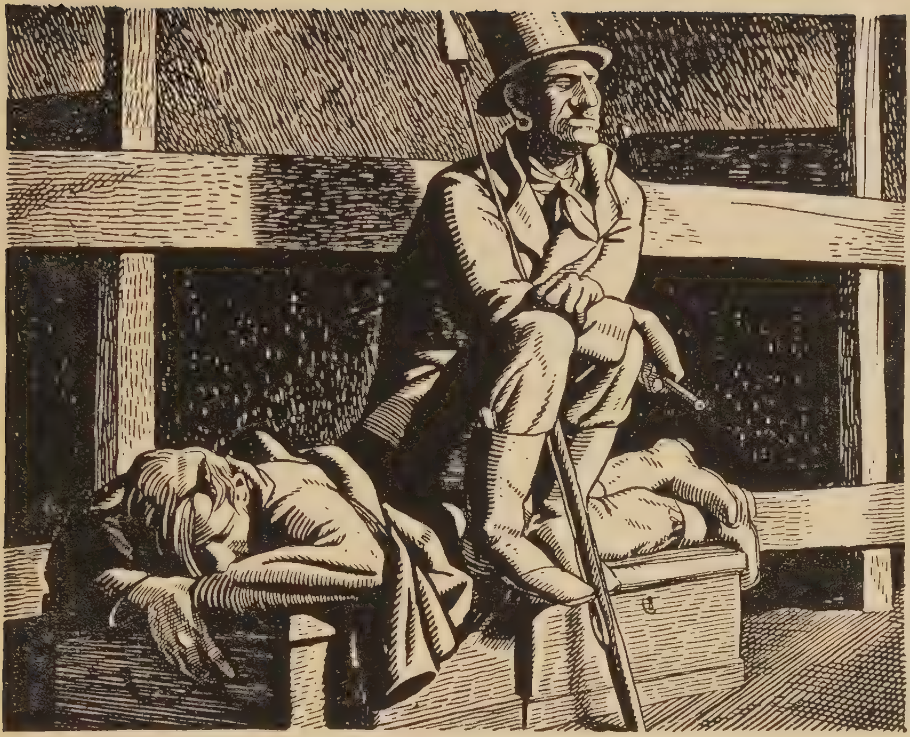
Reference must also be made to the work of W. A. Dwiggins, whose books are informed with a decided originality—perhaps one should say a pleasing whimsicality. In one of his books, "America Conquers Death," a unique combination of colours—red, Yale blue, and light green—has been used on the title-page and the initials, while excerpts in the text have been printed in red. An excellent specimen of good, straightforward text composition is to be found in his "Elizabeth and Essex," set in Caslon. It has a very handsome Dwiggins title-page. "Twenty-two Printers' Marks and Seals Designed or Redrawn by W. A. Dwiggins," which shows more of his decorative skill than of his typographical ability, is also interesting.

Offset, rotagravure, and aquatone printing offer so much for the future that experiments without end have been made in this field, many of them quite successful, but naturally most satisfactory in the printing of illustrations. Offset printing has been most generally used in the printing of advertising folders and booklets, while rotagravure printing has been generally adopted for the printing of illustrated supplements for newspapers, some printers specializing in this work to such an extent that their printed supplements are syndicated to Sunday newspapers throughout the country. Aquatone, in addition to the fact that it is the latest comer in this field, has necessarily been considerably limited in its use, but nevertheless this process has produced some of the most distinctive and beautifully illustrated books of recent years.

There has been a decided tendency on the part of the paper manufacturers to cooperate more closely with the printer, and they are now supplying every kind of paper that the printer needs to turn out the various grades of work. As a matter of fact, too, the demand for better paper is growing in the United States in a very healthy way, and for the past six months there has been a considerable increase in the amount of rag paper used in this country.

At the present time seven daily newspapers in the United States are printing an edition on all-rag paper for distribution to libraries and individuals who desire to preserve permanent copies of these papers. This is certainly a step in the right direction, and it may be hoped that more book publishers will follow the lead of the newspaper publishers in the use of better and more durable paper in their books.

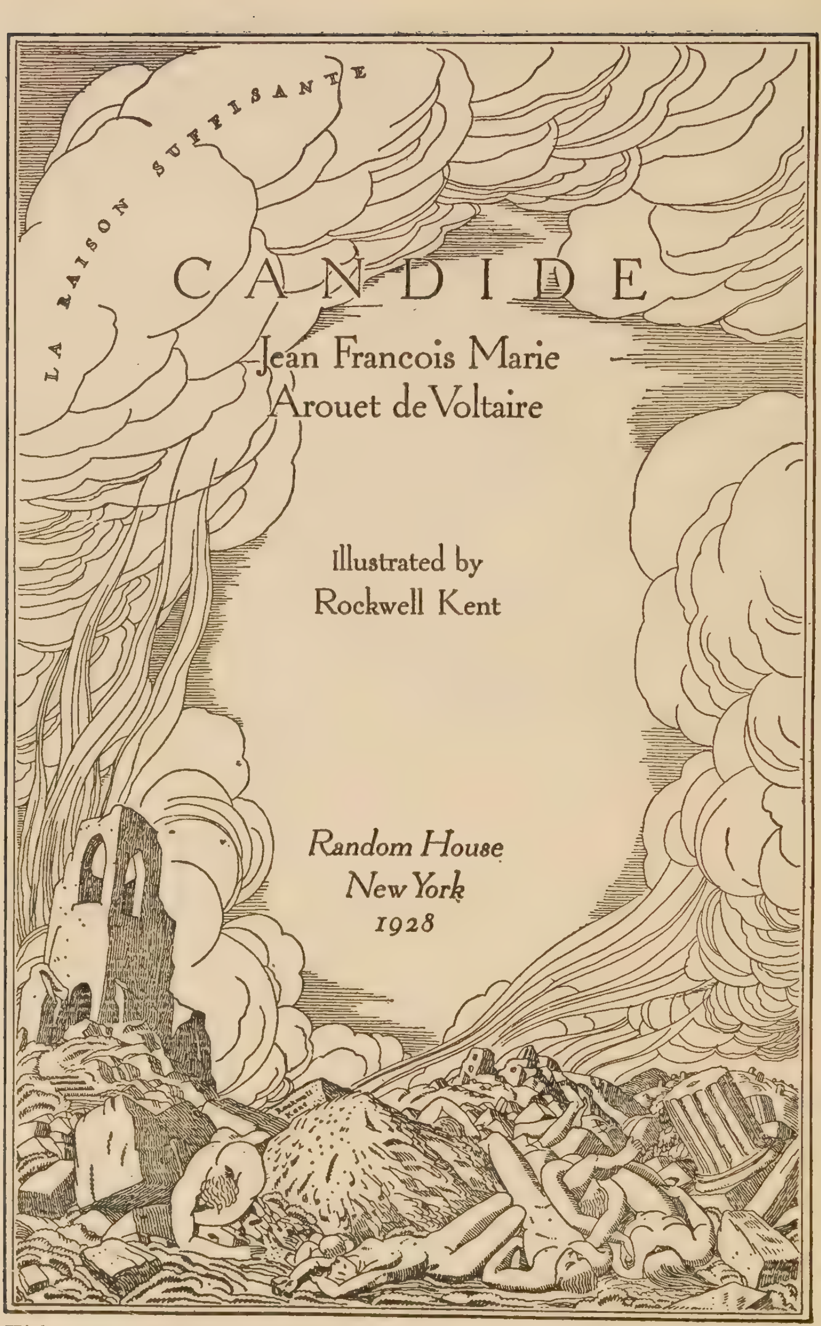
As may be seen, printing in the United States has progressed very decidedly during the few years just passed. Printers, and those in the trades allied to printing, may be depended upon to keep in step with



length upon two chests, his face downwards and inclosed in his folded arms. The profoundest slumber slept upon him.

"Those sailors we saw, Queequeg, where can they have gone to?" said I, looking dubiously at the sleeper. But it seemed that, when on the wharf, Queequeg had not at all noticed what I now alluded to; hence I would have thought myself to have been optically deceived in that matter, were it not for Elijah's otherwise inexplicable question. But I beat the thing down; and again marking the sleeper, jocularly hinted to Queequeg that perhaps we had best sit up with the body; telling him to establish himself accordingly. He put his hand upon the sleeper's rear, as though feeling if it was soft enough; and then, without more ado, sat qui-

Text page from "Moby Dick," illustrated by W. A. Dwiggins (Chicago, R. R. Donnelley and Co., 1930).



LA RAISON SUFFISANTE

CANDIDE

Jean Francois Marie
Arouet de Voltaire

Illustrated by
Rockwell Kent

Random House
New York
1928

Title-page from Mr. Rockwell Kent's edition of "Candide," printed for Random House by the Pynson Printers, New York.

further advances. The public, however, is notoriously fickle. It would seem, nevertheless, that the public has now become enough educated and sufficiently interested to demand a better product from the printer. In that, perhaps, lies the greatest hope for the future.

W. E. R.

ADDENDA

TECHNICAL TRAINING FOR PRINTERS

AN APPRENTICESHIP SCHEME

COURSES IN MANAGEMENT

Technical education in the printing craft includes all branches, technical and administrative; only large centres are able to make provision for a complete scheme of education, the smaller dealing only with the more generally useful technical subjects.

In a highly skilled trade such as this it is essential to introduce and maintain an exceptional standard of intelligence and practical skill, and the scope of the work is so wide that almost every type of natural ability can be usefully employed, whether mechanical, manipulative, artistic, or administrative.

In the past the selection of boys for apprenticeship has been haphazard, and they have been subject to no kind of serious mental or physical test, except by a few firms who realized that in accepting a boy as an apprentice a great responsibility was incurred. In these instances rigorous tests have been applied with satisfactory results. Among the many duties undertaken by the Joint Industrial Council for the Printing and Allied Trades, the formulation of an apprenticeship scheme is notable. It provides for the regulation of all matters relating to the subject, through a committee appointed in each large area, consisting of representatives of employers and employed, these committees to be responsible for the selection of suitable boys and the supervision of their training both in the workshops and technical institutions. A standard indenture is also provided, but it is to be regretted that the scheme is not compulsory at present, although in some centres gratifying progress is being made along the lines indicated.

The highly developed processes now operating require well-trained minds for their proper conduct, which the present standard of primary education does not provide. Raising the school-leaving age would be an unqualified advantage if in the later years, say thirteen plus, a proportion of the time were devoted to vocational studies.

In some sections of the trade pre-apprenticeship courses are available, the boys being preferably indentured on entering the course. In "Society" houses the trade unions exercise an effective control over the number of apprentices indentured, an arrangement on the whole beneficial, although the opinion may be held that the maximum number is insufficient for the normal requirements of a growing industry. The normal age for apprenticeship is fourteen, but one trade union at least has admitted the advantages of a secondary education by agreeing to accept a school training up to sixteen as part of the apprenticeship period.

Until recent years the technical training of apprentices has been in part-time evening classes, the boys usually attending two evenings a week for three or four years for practical and theoretical instruction. It has been realized that this system is bad, because late hours put a severe strain on the vitality of growing boys. At present successful day classes are held in most big cities, the class time being part of the day's work.

The equipment of a printing school must be thoroughly efficient and modern, so that students may receive instruction in the latest developments in the craft and become accustomed to working under proper conditions. The provision of such equipment makes it possible to institute classes where journeymen may keep abreast with the latest developments and new processes. In this way advanced technical knowledge is absorbed more rapidly by the trade as a whole. A modern equipment also enables the teaching staff to work out new methods and to assist in technical investigations. Every encouragement should be given to such activities.

Printing classes are held either in technical or art schools, and according to the environment one or the other aspect of training receives emphasis. The bias towards art has its advantages in such subjects as typographic composition or lithographic design, and may have some value in raising the artistic value of the work undertaken. Nevertheless, it has been found possible to maintain this advantage in printing classes in technical schools, and as the most serious portion of the training must be technical, this type of school is generally preferred.

There is only one example of a monotechnic printing school, but there is another for a kindred trade in the L.C.C. School of Photo-Engraving and Lithography.

The London School of Printing exemplifies an efficient organization covering all the needs of the trade. This school has grown so rapidly in recent years that several additions have been made, an important one being now under consideration. The total number of individual student entries in the session of 1928-29 was nearly 3,000, and of these 1,500 were part-time apprentices sent by employers during working hours. In the Managerial Course, described in a later paragraph, which is confined to sons of master printers from all over the world, forty-eight students attended. In London the major portion of technical training is now at this school, but classes are held also at the Central School of Arts and Crafts, at the Camberwell School of Arts and Crafts, and at the North-Western Polytechnic Institute, opened by the Prince of Wales on October 17, 1929.

The large provincial centres have well-conducted printing courses at Manchester, Leeds, Birmingham, Leicester, Edinburgh, Glasgow, and a number of other cities.

The selection and training of persons to fill administrative posts is of serious importance. The usual practice has been for master printers' sons to gather information and experience in the workshops, going through the departments and finishing in the office. Managers are usually selected from the best overseers, these in turn being promoted from journeymen. In the former case the instruction is likely to be superficial and partake of the method of rule of thumb; in the latter the training is thorough—within the limits prescribed. It is clear, however, that such methods can at the best provide only a portion of the required knowledge, and it is impossible for this to be systematically acquired with a proper regard for both the technology and science underlying workshop practice, and the systematic study of administration, economics, accountancy, costing, and other important subjects required for the efficient conduct of an administrative post.

In a managerial course at a printing school the important subjects are covered, although it is unnecessary to devote so much time to each as in the case of apprentices, because, first, the students have a better general education; and, secondly, a knowledge is required of how the work is done and the methods of correcting errors rather than precise skill in a single subject.

Courses in management have been organized in recent years and are well supported by the sons of master printers and others who are to fill executive positions. Each year at the London School of Printing there is an increase in the applications for courses, extending from one to three years. Similar courses are available at Manchester, and at Leeds printing is accepted as one of the subjects in the three-year course leading to B.Com. The endowment of scholarships to enable workers and senior apprentices to qualify for responsible executive positions will be welcomed by the industry. The Newspaper Proprietors' Association and the Winterbottom Cloth Company have each provided the sum of £150 to institute a scholarship of this kind tenable at the London School of Printing.

Training courses for teachers of printing subjects would be of value. Instructors, and lecturers particularly, should have a sound general education and some knowledge of teaching method; these qualities are not always combined with craft ability. At present teachers are drawn from the workshops, and those who possess natural teaching ability carry out their duties with success.

Technical training in the printing trade has now reached a high standard of efficiency in London and the large provincial centres.

R. B. F.

ST. BRIDE INSTITUTE LIBRARY

A RESORT FOR CRAFTSMEN

Down a narrow lane off Fleet-street, with its windows under the lovely spire of St. Bride's Church, is the largest library devoted solely to printing in the United Kingdom, and the only public printing library in London. It is part of the St. Bride Institute and is supported entirely by voluntary contributions. It is essentially a practical library, formed round the collections of three master printers, William Blades, J. Passmore Edwards, and Talbot Baines Reed.

The Blades Library was the nucleus of it. It was bought by the Governors of the Institute at the end of the last century, and contained more than 2,000 works which had served Blades in his great and almost pioneer research work. This collection includes mainly books on the origin and history of printing, special treatises on the practice of the craft, and works on lithography. There is also a great body of tracts and pamphlets of contemporary or local significance which are, many of them, unobtainable elsewhere. The Passmore Edwards Library was bought with money given by Passmore Edwards, and though to some extent historical, like the Blades collection, is mostly composed of technical works on the modern developments of printing. The Reed Library, also bought through the generosity of Passmore Edwards, comprises specimens of the great presses of Europe and typographical works which Reed gathered together for his *magnum opus* on "The Old English Letter Foundries."

Both Blades and Reed recognized the value and importance of type specimen books, and they searched the book markets of the world for them. With other specimens since acquired, the library's collection of them is probably unrivalled. Several other libraries have been added to the collection, largely by the good will of Mr. C. J. Drummond, including those of John Southward and the London Society of Compositors. The total number of works in the library is about 12,000.

An important side of the library is its store of printing periodicals of all countries, which in their latest issues lie on the tables. The Governors constantly increase the collection by purchases out of the library funds of historical works or rare books on printing that come on the market. But the library depends for most of its modern matter on the generosity of publishers and authors, who present to the library fine works that it could not otherwise afford to buy.

The library is catalogued throughout in ways well suited to the student, even down to the recording of all articles in periodicals to which it has access on subjects bearing on printing. The library contains many rare and valuable works, including incunabula and fine books in all centuries, and many very beautiful examples of typography. It can provide anyone who would learn the practical aspects of the printer's craft with the fullest range of historical and technical works, and nowhere else can the research worker find the materials of his study so ready to his hand. But it is also an extremely pleasant place to sit and read—out of the crowd, and disturbed only by the chimes of St. Bride's bells.

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